# EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

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I hereby declare that the thesis entitled "**EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY**" submitted towards partial fulfillment of the requirements for the award of **MS in GENERAL SURGERY** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Munish Trehan**, Associate Professor, Department of Surgery, **Dr. Jaspal Singh**, Professor & Head, Department of Surgery and **Dr Sanjeev Kumar Singla**, Professor, Department of Surgery. No part of this thesis has formed the basis for the award of any degree previously.

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*Dedicated*

*to*

*my Family*

*&*

*Teachers*

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***Dr. Vishal Mangotra***

# LIST OF ABBREVIATIONS

| | |
|---|---|
| ALP | Alkaline phosphatase |
| BMI | Body mass index |
| CBD | Common bile duct |
| ESWL | Extracorporeal shock Wave Lithotripsy |
| GB | Gall bladder |
| LC | Laparoscopic cholecystectomy |
| LFT | Liver function test |
| Pvalue | Predictivevalue |
| USG | ultrasonography |
| WBC | White blood cells |

# ABSTRACT

**Introduction:** Laparoscopic cholecystectomy is established as the gold standard for benign gall bladder disease. The advantages of laparoscopic cholecystectomy are many but not devoid of complications. Sometimes LC becomes difficult. It can take longer time. Occasionally it may need conversion to open cholecystectomy for safe removal of gallbladder. The ability to accurately identify an individual patient's risk for conversion based on preoperative information can result in more useful and accurate preoperative counselling. Hence in this dissertation, study is done for evaluation of preoperative scoring system given by Randhawa and Pujahari considering various pre-operative parameters to predict difficulty in laparoscopic cholecystectomy.

**Objectives:** Preoperative prediction of difficult laparoscopic cholecystectomy using a scoring system considering various pre-operative factors in elective/interval laparoscopic cholecystectomy to predict difficult gallbladder.

**Methods:** A Prospective study of 120 patients admitted for laparoscopic cholecystectomy from January 2020 to June 2021 in Department of General Surgery, Dayanand Medical College and Hospital, Ludhiana, were analyzed. All the patients were evaluated on the basis of Randhawa and Pujahari scoring system with following variables: age>50 years, male sex, BMI 25.1 to 27.5 and >27.5 $Kg/m^2$, previous abdominal surgery, prior hospitalization for gall stone disease, palpable gall bladder, gall bladder wall thickening, impacted stone, pericholecystic collection. Each variable had given a score. Intra operative findings such as time taken for the surgery, biliary/stone spillage, injury to duct/artery or conversion to open cholecystectomy were noted. Based on these findings surgical procedure was defined as easy, difficult and very difficult. The study was approved by Institutional Ethical Committee and an informed consent was obtained from all the patients.

**Results:** 120 cases satisfying the inclusion criteria were studied comparing different variables and assigned pre-operative scoring. Score >5 was considered significant and compared with intraoperative findings. Out of 53 patients having pre-operative score >5, 40 were difficult gallbladder and 13 were easy to operate. Prediction came true in 93.0% for difficult cases and 83.1% for easy cases.

**Conclusion:** From this study, We can conclude that preoperative scoring system is statistically reliable to predict difficulty in laparoscopic cholecystostomy in majority of the cases (area under ROC = 0.935).



**Key words:** LC, Predictive factors, Scoring system.

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# INTRODUCTION

Gall stones are the most common biliary pathology. The majority of gallstones are asymptomatic. Despite this, gallstone disease is the leading cause of Gastrointestinal problems for which patients are admitted to hospital and accounts for an important part of Healthcare expenditure[1].

The prevalence of gallstones varies widely in different regions of the world. An epidemiological study restricted to rail road workers of India showed the incidence of gallstones as 18 per 100,000 with big geographical differences in incidence rates. The disease being seven times more common in north Indians as compared to south Indians [2].

For many years, estimates of the frequency of gallstones have been made from necropsy studies or studies of clinically diagnosed cases of gallstones, which do not represent the true prevalence in the general population[2-4]. As most gallstones stay asymptomatic during a lifetime. Such data give an under-estimate of the true prevalence of gall bladder disease by failure to identify asymptomatic disease.

More reliable epidemiological studies now use transabdominal ultrasound to screen robust numbers in defined asymptomatic populations. Ultrasonography is an ideal means to quantitate the frequency of gallstone disease, being a noninvasive and safe imaging technique that accurately can detect the point prevalence of gallstones in a defined asymptomatic population.

Gall stones constitute a significant health problem in United States also, affecting 10-15% of adult population[5-6]. In either sex, the prevalence increases with age. Throughout the world, gallbladder diseases are predominantly a female disease.

In India incidence of gall stone disease is changing. Its increasing especially in 3$^{rd}$ to 5$^{th}$ decade of life. Obesity & diet rich in saturated fatty acids are strongest risk factors. This change is mainly attributed to westernization and availability of radiological investigation that is ultrasound in both rural and urban areas and due to change in socioeconomic structure [7-8].

As clinically majority of gall stones are asymptomatic, So Most of them are found when clinician performs transabdominal ultrasound for some other reasons. According to a study, nearly one in ten individuals with asymptomatic gallbladder stones in the general population may be expected to develop symptoms or complications that require treatment within 5 years [9].

The clinical presentation of gall stones include acute cholecystitis a febrile illness with pain and tenderness in the right upper quadrant (Murphy Sign). The other non specific symptoms are belching, heartburn, nausea, vomiting, epigastric discomfort, and intolerance to fatty food [10-12]. The other clinical manifestations of gall stones include biliary colic, jaundice and acute pancreatitis.

Karl Langenbuch performed the first open cholecystectomy in 1882 [13]. From this time forth, Gall stone disease, was being dealt by open cholecystectomy. In 1985, Prof Dr Erich Muhe of Boblingen, Germany performed the first laparoscopic cholecystectomy[14]. With the introduction of laparoscopic cholecystectomy, the surgical community witnessed a revolution in ideology and minimal access surgery gained tremendous popularity.

This has supplanted open cholecystectomy, and also ended attempts towards noninvasive management like extracorporeal shock wave lithotripsy and bile salt therapy.

Laparoscopic cholecystectomy is considered the most cost-effective management strategy in the treatment of symptomatic gallstones. Medical management strategies are mostly palliative and are not widely supported. Patients with longer-lasting biliary pain, in combination with abdominal tenderness, fever, and/or leukocytosis, require an ultrasound evaluation to help establish a diagnosis of acute cholecystitis. Once a patient is diagnosed, having cholecystectomy early in the course of the disease can significantly reduce the hospital stay [15].

In 1992, The National Institute of Health (NIH) consensus development conference stated that laparoscopic cholecystectomy 'provides a safe and effective treatment for most patients with symptomatic gallstones. Since the Introduction of Laparoscopic cholecystectomy, the number of cholecystectomy performed in the United States has increased from 5 lakh per year to 7 lakh per year [16].

The advantages of laparoscopic cholecystectomy over open cholecystectomy are immediately appreciated, earlier return to bowel functions, less postoperative pain, improved cosmesis, shorter length of hospital stay, earlier return to normal activity and decreased overall cost [17]. Patients with bleeding diathesis and carcinoma gall bladder are the only major contraindications of treating gall stone disease with laparoscopic procedure.

According to recent studies, laparoscopic removal of gall bladder may be completed with morbidity and mortality comparable to or less than that of traditional open cholecystectomy when performed by an experienced surgeon [18]. Limitations of laparoscopy are costly equipment and unavailability of such equipment.

Now (LC) has become procedure of choice for management of symptomatic Gall stone diseases [19,20] for its minimal invasive, less pain and early recovery. Sometimes LC becomes difficult. It can take longer time or bile/ stone spillage. Occasionally it may need conversion to open cholecystectomy to avoid or repair injury, delineate confusing anatomic relationships, or treat associated conditions. Conversion to open cholecystectomy has been associated with increased overall morbidity, surgical site & pulmonary infections and longer hospital stays. It is very difficult to say preoperatively whether it is going to be easy or difficult.

Therefore, it would be worthwhile to evaluate the possibilities of predicting the chances of difficult laparoscopic cholecystectomy. Since laparotomy is associated with greater morbidity and prolonged convalescence compared with laparoscopy, understanding the true risk of the surgery allows the

patient to make a better informed decision, realistic plan for work and personal matters. It ensures safety to the patient and also avoid litigation.

There have been many attempts to this approach and various parameters, blood investigations, clinical examination and radiological investigations have been analyzed.

The preoperative prediction aims at patient counselling and also guiding the surgeon to decide on an conversion, should difficulty arise and also involve an experienced surgeon in the task and thereby ensure patient safety. Another benefit would be to allow more efficient scheduling of the operating lists and ensuring the availability of a more experienced laparoscopic surgeon for the procedure.

At present, there is no standard scoring system available to predict the degree of difficulty preoperatively. In this study, we have worked out a scoring system proposed by J. S. Randhawa, A. K. Pujahari [21] for predicting the difficulty in LC preoperatively and correlated with our intraoperative degree of difficulty. The study also identifies the factors that can predict difficulty in LC and thus complications can be prevented beforehand.

# AIMS AND OBJECTIVE

Preoperative prediction of difficult laparoscopic cholecystectomy using a scoring system.

# REVIEW OF LITERATURE

## HISTORICAL ASPECTS[22]

Among the many names in Indian medicine, 'SUSRUTA 'The father of Indian Surgery'' stands out in his prominence. He compiled the surgical knowledge of his time in his classic ''Susruta Samhita''. He described PITTA ASHMARIJANYA'' meaning jaundice caused by stone in bile.

**Morgagni** published in 1769 an analysis an of diseases of the liver and biliary tract. This text has analyzed the distribution of gallstones in male and female patients, including the age, incidence and treatment.

**Vater**(1684-1751) was the first to describe the papilla of duodenum. In 1720 he stated that "those double ducts (bile and pancreatic ducts) come together in single combination''.

**Pettit** introduced the term biliary colic.

**Zambeccarri** in 1630 and **Teckoff** in 1667 had performed cholecystectomy in dogs and had shown that the gall bladder was not essential to living.

Biliary surgery began on July 15, 1867 in India when **Bobbs** operated on a woman who had a large tumour, which he believed to be an ovarian cyst. To his amazement, he found an enormous gall bladder filled with stones. He opened it and extracted the calculi, sutured it and replaced it again in the abdomen (Bobbs, 1868).

**1882:** Langenbuch performed first elective cholecystectomy.

**1882:** Von winiwarter developed cholecystoenetreostomy

**1895:** Kocher wrote an article on internal choledochoduodenostomy to remove supra ampullary choledochal calculi .

**1897:** Kehr placed a rubber tube in the common bile duct through the cystic duct. That was the first systematic use of biliary intubation.

**1898:** Thornton performed the first removal of a stone from the CBD.

German and Austrian surgeons were the first to perform supra duodenal choledochoduodenostomy.

Sprengels operation described a side-side choledochoduodenostomy, and this subsequently became famous in Europe and the United States and later by many surgeons including Oddi[23].

**1898:** Mac Burney published his experience with duodenostomy and papilotomy in patients with impacted periampullary calculi.

**1912:** Kehrs developed t tube.

**1923:** Bakes developed choledochoscopy.

**1924:** Graham developed oral cholecystography.

**1932:** Mirrizzi developed post operative cholangiography

**1937:** Mirrizzi developed intra operative cholangiography

**1989:** Dubois in Paris published the first series of laparoscopic cholecystectomies

**History of laparoscopy and Laparoscopic Cholecystectomy:**

Laparoscopy from Greek, Laparo meaning the flank and skopein meaning to examine. The first experimental laparoscopy was performed in Berlin in 1901 by the German surgeon Georg Kelling of Dresden, who used a cystoscope to peer into the abdomen of a dog after first insufflating it with air. Kelling also used room air filtered through sterile cotton to create pneumoperitoneum, with the goal of stopping intra-abdominal bleeding (Ectopic pregnancy, bleeding ulcers, and pancreatitis)[24].

The use of carbon dioxide ($CO_2$) for pneumoperitoneum was first recommended by Richard Zollikofer of Switzerland in 1924.

The primary mode of insufflation was the veress needle which was introduced by janos veress of Hungary in 1938.

In 1933, A German general surgeon, Feower was the first to report laparoscopic lysis of abdominal adhesions for the diagnosis of bowel obstructions.

In 1967, Patrick Skeptoe performed laparoscopic tubal ligation & popularized it.

Kurt Semm incorporated new aspects of fiber optic and used automatic gas insufflator which allowed precise controlled intra abdominal pressure.

In 1985, Muhe of boblinger, Germany performed the first laparoscopic assisted cholecystectomy. In 1987, a French surgeon in Lyon, Phillipe Mouret, performed the first video-laparoscopic cholecystectomy[25].

The procedure had immediate acceptance by patients and surgeons based on clinical experience, and became rapidly popular without randomized trials. It did not take long for a consensus to develop and for the National Institutes of Health to pronounce (LC) as, 'the treatment of choice for many patients with symptomatic cholelithiasis.' [26] Retrospective data shows (LC) to be safe and effective, and when compared to open cholecystectomy the advantages of (LC) have been described as, 'obvious and compelling.'

As per Pouvourville et al.[27] the actual cost of surgery is increased in laparoscopic cholecystectomy, but the total cost including productivity loss, hospital stay and post-operative analgesics was higher in open cholecystectomy. (LC) has served as the igniting spark in the laparoscopic surgery explosion and has paved the way for more complex laparoscopic procedure which have become commonplace. But still approximate 5-10 % requires conversion to open cholecystectomy due to various reasons[28-29].

Some preoperative variables may help to predict the difficulty and risk of conversion in a particular patient. Some of the preoperative factors risk factors that has been cited include advanced age, male gender, previous abdominal surgery, obesity, gallbladder wall thickness, pericholecystic fluid and. Many studies have been attempted to evaluate these factors which makes laparoscopic cholecystectomy (LC) difficult and to predict conversion to an open surgery preoperatively.

In a study conducted by Kama et al.[30], in Ankara Numune Hospital of turkey, of the 1000 patients in whom laparoscopic cholecystectomy was attempted, 48(4.8%) required conversion to open surgery. The preoperative variables included were age, sex, medical history, previous operations, previous attacks of acute cholecystitis, symptoms, physical examination findings, laboratory data and findings of imaging studies. Operation times of patients with different scores were compared. Significantly independent

predictive factors for conversion were male gender, previous abdominal surgery, acute cholecystitis, thickened gallbladder wall on preoperative ultrasonography, and suspicion of common bile duct stones.

A study performed by Lee et al. in Eastern Virginia Medical School Department of Surgery 'total of 346 Laparoscopic cholecystectomies and Laparoscopic to open cholecystectomies' were identified. The Laparoscopic to open group had 41 identified with a conversion rate of 11.9 per cent. The Laparoscopic to open group was compared with 100 randomly chosen laparoscopic cholecystectomies. Risk factors that reached statistical significance for conversion included advanced age, male gender, previous upper abdominal surgery, preoperative diagnosis of acute cholecystitis, and gallbladder wall thickness greater than 3 mm (P = 0.0009). Average operative time was higher in Lap converted to open (LOC) compared with open cholecystectomy (123 minutes average vs 109 minutes average). Of the reasons for conversion, the degree of inflammation was the most common (51.2%). Preoperative risk factors that were associated with need for conversion were advanced age, male gender, previous upper abdominal surgery, preoperative diagnosis of acute cholecystitis, and pericholecystic fluid[31].

An another study was conducted by Elgammal et al. in department of General Surgery of Menoufia University Hospital. A total of 100 patients were included in this study. Four (4%) patients were converted to open cholecystectomy. Previous history of hospitalization, wall thickness, advanced age, male sex, palpable GB and impacted stones were found to be statistically significant in predicting difficult laparoscopic cholecystectomy[32].

Simopoulo et al. conducted a study to evaluate preoperative factors associated with conversion to open cholecystectomy in elective cholecystectomy and acute cholecystitis. The records of 1,804 patients who underwent cholecystectomy were reviewed retrospectively. The demographics and preoperative data of patients who required conversion

to laparotomy were compared to those with successful laparoscopic cholecystectomy. Conversion to open cholecystectomy was needed in 94 patients (5.2%), of which 44 (2.8%) had no inflammation and 50 (18.4%) had acute inflammation of the gallbladder. Male gender, age older than 60 years, previous upper abdominal surgery, diabetes, and severity of inflammation were all significantly correlated with an increased conversion rate to laparotomy. Also, the conversion from laparoscopic to open cholecystectomy in acute cholecystitis patients was associated with greater white blood cell count, fever, elevated total bilirubin, aspartate transaminase, and alanine transaminase levels, and the various types of inflammation[33].

Fried GM et al. conducted a study of 1,676 consecutive patients in whom laparoscopic Cholecystectomy (LC) was attempted. Factors evaluated were age, sex, history of acute cholecystitis, pancreatitis, or jaundice, previous abdominal surgery, abnormalities of liver function tests, thickened gallbladder wall identified by preoperative ultrasound, obesity or morbid obesity, and cumulative institutional experience in (Laparoscopic cholecystectomy) LC. Conversion to open cholecystectomy (OC) was required in 90 of 1,676 (5.4%) patients. Significant preoperative predictors of conversion were acute cholecystitis, increasing age, male sex, obesity, and thickened gallbladder wall found by ultrasound[34].

Another study by Ahmat Alponat et al. Data from 783 patients in whom Laparoscopic cholecystectomy (LC) was attempted was retrospectively analyzed. Conversion was required in 58 (7.4%) patients, of which 48 (83%) were elective and 10 (17%) emergency. Factors evaluated were age, sex, obesity, duration of gallstone disease, co-morbid factors, indication for surgery, previous abdominal surgery, fever, physical examination findings, white blood cell (WBC) count, liver function tests, ultrasound findings, and the experience of the surgeon. Acute cholecystitis, rigidity in the right upper abdomen, fever, thickened gallbladder wall on ultrasonography, elevated alkaline phosphatase (ALP), liver transaminases and the WBC count were

significant predictors of conversion in the univariate analysis. Multivariate logistic regression analysis on these significant predictors showed that acute cholecystitis [odds ratio (OR) = 3.12], thickened gallbladder wall on ultrasonography (OR = 3.75), elevated ALP (OR = 2.23), and WBC count (OR = 3.69) were jointly significant[35].

A study was conducted by livingstone et al. to determine the national incidence and risk factors for conversion from laparoscopic to open cholecystectomy. The National Hospital Discharge database was acquired. All gallbladder disease related admissions were extracted. Approximately 25% of all cholecystectomies were performed by the open technique. Of the remaining 75%, there was approximately 5% to 10% conversion rate. The major risk factors for conversion were male sex, obesity, and cholecystitis. Concurrent choledocholithiasis, cholelithiasis, and cholecystitis were associated with a conversion rate of 25%[36].

Nikhil gupta et al.[37] conducted study in the department of surgery, Lady Hardinge Medical College and associated Dr Ram Manohar Lohia Hospital, Delhi. A total of 210 patients were included in the study. On evaluation they found that history of hospitalization, palpable gall bladder, impacted stone and increased gall bladder wall thickness were statistically significant factors for prediction of difficult laparoscopic cholecystectomy.

Shrirang V. Kulkarni and Sukumar S. Kumar conducted a study in, Command Hospital (SC), Pune, Maharashtra, India. 166 patients were enrolled with age ranging from 10-80 years, maximum incidence (36.14%) being in the age group 35-50 years. The time taken for LC increased significantly with increasing age. 70.48% were females but gender status did not affect the difficulty. Increasing body mass index (BMI) also increased the surgery time as well as the conversion rate (7.69% in patients with BMI >30Kg/m2). Clinically palpable gallbladder increased the surgery duration, difficulty and conversion rate. TLC >11000/mm3, contracted gallbladder, wall thickness ≥4mm made LC longer, while multiple stones increased

surgeon's difficulty and impacted stone in gallbladder neck increased the conversion rate[38].

Jagdish Nachnani and Avinash Supe conducted a study in Seth G S Medical College & Hospital, Mumbai. In which 105 patients were enrolled. Out of which 12 (11.4%) required conversion to open cholecystectomy. Significant predictors of conversion were body mass index> 30 Kg/m2, male gender, past history of acute cholecystitis or acute pancreatitis, past history of upper abdominal surgery, and gall bladder wall thickness exceeding 3 mm[39].

Debananda Tudu & Bana Bihari Mishra [40] conducted a study at VSS Institute of Medical Sciences and Research, Odisha. One hundred patients with symptomatic cholelithiasis were taken up for the study. They were evaluated for various risk factors. Out of which, Previous abdominal surgery, duration since acute attack, number of previous attacks, ultrasonography findings of increased wall thickness, stone impaction at neck and pericholecystic collection, increased total WBC count are associated with difficult laparoscopic cholecystectomy.

# MATERIALS AND METHODS

This prospective observational study was carried out on patients admitted in Department of General Surgery, Dayanand Medical College and hospital, Ludhiana over the period one and half year. Approval from the ethical committee of institution was taken before starting the study. A total 120 patients were included after in this study after prior informed consent.

**Sample size –** Time bound study.

**Duration of study:** 1st January 2020 to 30th June 2021.

Selection of study patients

**Inclusion criteria –**

All the patients who have been clinically and radiologically (ultrasound abdomen) diagnosed with Acute or chronic cholecystitis/ symptomatic cholelithiasis and planned for laparoscopic cholecystectomy.

**Exclusion criteria –**

1. Patient with CBD stone, where CBD exploration is required.
2. Patients with features of obstructive jaundice, concurrent pancreatitis.
3. Laparoscopic cholecystectomy performed with other laparoscopic intervention in same setting.
4. Lap to open conversion due to equipment failure.

**METHOD OF COLLECTION OF DATA**

We collected the data after the workup on admission and prior to surgery in the form of detailed proforma including basic details, history, examination & sonographic findings. Written consent was signed by the participants.

TABLE 1: PARAMETERS OF PREOP SCORING

| **History** | | **Score** | | **Score** | **Max** |
|---|---|---|---|---|---|
| Age | ≤ 50 Y | 0 | >50 Y | 1 | 1 |
| Sex | Female | 0 | Male | 1 | 1 |
| H/o Hospitalization | No | 0 | Yes | 4 | 4 |
| **Clinical** | | | | | |
| BMI | <25 | 0 | 25-27.5<br>> 27.5 | 1<br>2 | 2 |
| Abdominal Scar | No | 0 | Infraumblical<br>Supraumblical | 1<br>2 | 2 |
| Palpable gall bladder | No | 0 | Yes | 1 | 1 |
| **Sonography** | | | | | |
| Wall thickness | Thin <4mm | 0 | Thick >4mm | 2 | 2 |
| Pericholecystic collection | No | 0 | Yes | 1 | 1 |
| Impacted stone | No | 0 | Yes | 1 | 1 |
| | | | Maximum Score | | 15 |

Preoperative scores were given to each patient on the basis of history, clinical examinations & ultrasonographic findings (Table 1). On the basis of this preoperative score, patients were categorized into easy or difficult if score ≤5 or >5 respectively. Following evaluation, patients underwent laparoscopic cholecystectomy & the following intraoperative events were recorded.

TABLE 2: CATEGORIES OF DEGREE OF INTRAOPERATIVE DIFFICULTY

| **Intra Operative difficult Criteria** | | **Score** |
|---|---|---|
| Easy | Time taken <60 min, No bile spillage, No injury to duct / artery | 0-5 |
| Difficult | Time taken 60-120 min, bile / stone spillage, Injury to duct, No conversion | 6-10 |
| Very difficult | Time taken > 120 min, conversion to open surgery | 11-15 |

Surgery were done using CO2 pneumoperitoneum with 10-12mm Hg pressure and using standard two 10 mm and two 5 mm ports. The timing were noted from the first port site incision till the last port closure. All the intraoperative events were recorded. Operation were conducted under general Anaesthesia. Laparoscopic cholecystectomy were performed by different competent surgeons (with experience of more than 10 years and performed more than 200 independent LC). Intra-operatively significant data indicating the difficulty of the procedure were recorded such as {bleeding per cystic artery, bile spillage, prolonged time of surgery >60 min), and cases were divided into easy and difficult ones accordingly (table 2). Postoperatively most of the cases transferred to ward for 24 hours then discharged after removal of drain and ensuring no complications. Preoperative Score and surgery outcome were compared.

**Statistical analysis**:

The collected data was compiled in Microsoft excel sheet. Data were described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. For comparing categorical data, Chi square ($\chi 2$) test was performed and exact test was used when the expected frequency is less than 5. Receiver operator characteristics (ROC) curve was done, and criterion value was

estimated depending on the specificity and sensitivity. Area under curve (AUC) was measured. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

# OBSERVATIONS AND RESULTS

This study included 120 patients. These were clinically and radiologically (ultrasound abdomen) diagnosed with Acute or chronic cholecystitis/ symptomatic cholelithiasis admitted for laparoscopic cholecystectomy in Dayanand Medical College and Hospital, Ludhiana during the period of Jan 2020 to June 2021. Available literature on cholelithiasis was reviewed and results of the study were compared with those of other authors.

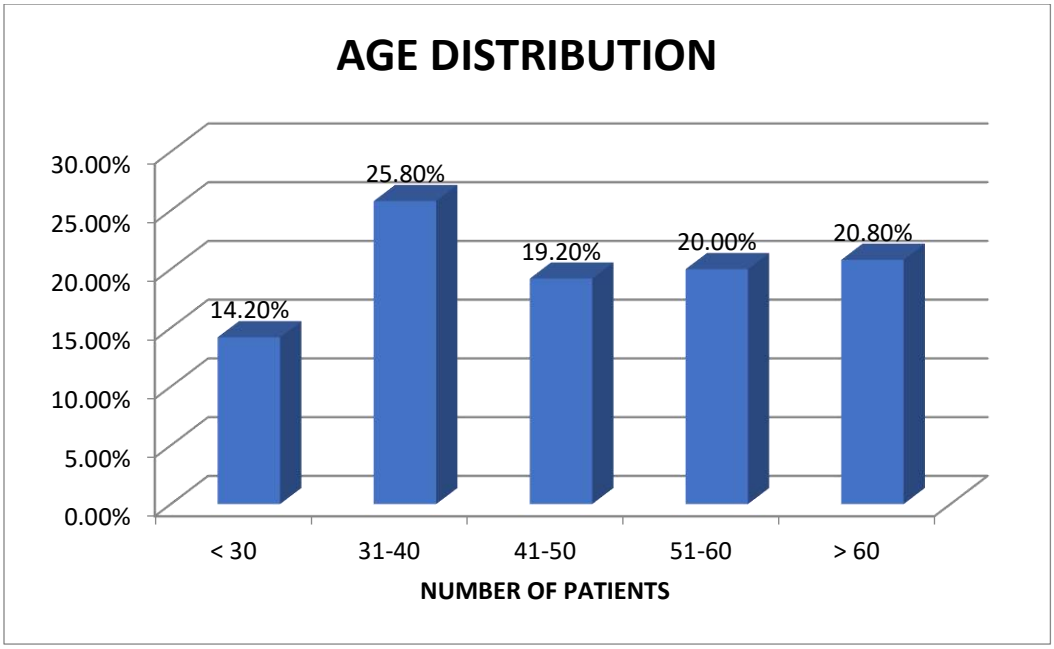
**AGE OF INCIDENCE**

In present study maximum cases were in the age group of 31-40 years 31(25.8%), 23(19.2%) in 41-50 years, 24 (20.0%) in 51-60 years, 25 (20.8%) in >60 years and 17(14.2%) in <30 years old. The mean age was 46.47 with S.D- 15.07. The youngest patient age was 17 years and older was 85 years.

TABLE 3: AGE WISE DISTRIBUTION OF THE CASES

| Age group | No. of cases | Percentage |
|---|---|---|
| < 30 | 17 | 14.2% |
| 31-40 | 31 | 25.8% |
| 41-50 | 23 | 19.2% |
| 51-60 | 24 | 20.0% |
| > 60 | 25 | 20.8% |

FIGURE 1: AGE WISE DISTRIBUTION OF THE CASES



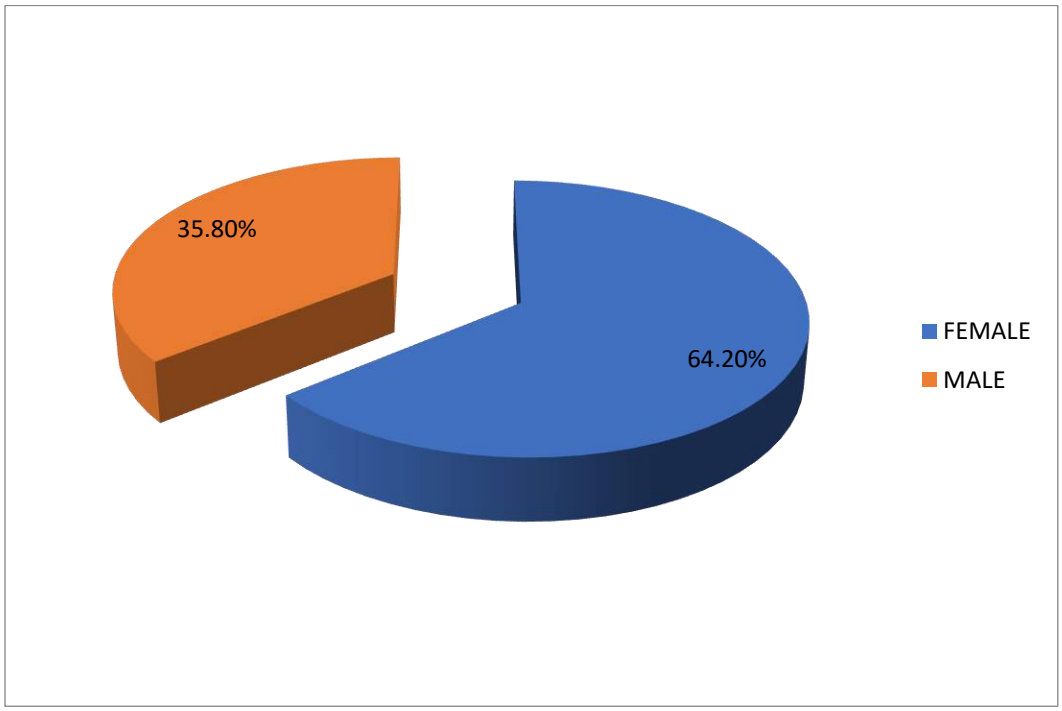
**DISTRIBUTION OF CASES BY GENDER**

Out Of 120 patients, 77(64.2%) were females and 43(35.8%) were males. Sample population was dominated by females. Showing gall stone disease is more common in female population.

TABLE 4: GENDER DISTRIBUTION OF CASES

| Sex | No. of cases | Percentage |
|---|---|---|
| FEMALE | 77 | 64.2% |
| MALE | 43 | 35.8% |
| Total | 120 | 100.0% |

FIGURE 2: GENDER DISTRIBUTION OF CASES



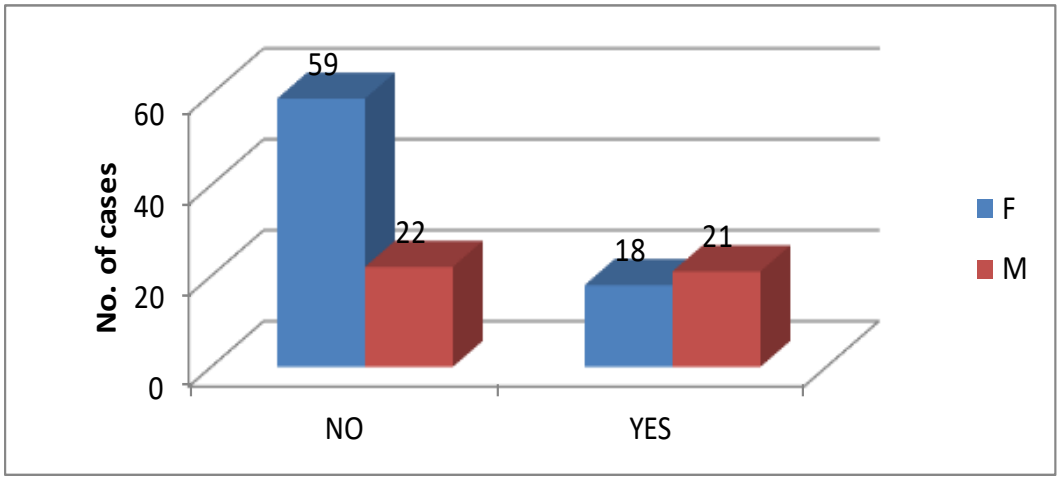
**PAST HISTORY OF HOSPITALIZATION FOR ACUTE CHOLECYSTITIS**

In our study, 39 patients had history of hospitalization for prior acute cholecystitis. Among 39, 18 were females and 21 were males.

TABLE 5: PAST HISTORY OF HOSPITALIZATION FOR ACUTE CHOLECYSTITIS

| H/O HOSPITALIZATION | MALE | FEMALE | TOTAL |
|---|---|---|---|
| NO | 22 | 59 | 81(67.5%) |
| YES | 21 | 18 | 39(32.5%) |
| Total | 43 | 77 | 120 |

FIGURE 3: PAST HISTORY OF HOSPITALIZATION FOR ACUTE CHOLECYSTITIS



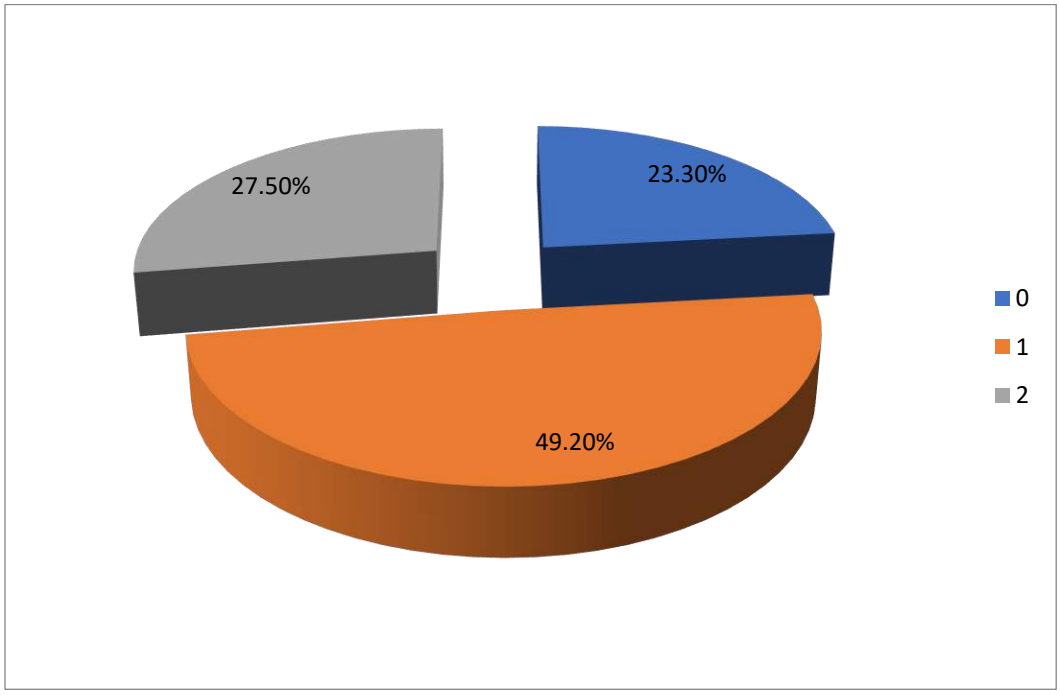
## DISTRIBUTION OF CASES BY BMI

Almost half of the patients (59, 49.2%) were with BMI 25-27.5 kg/$m^2$.
28 (23.3%) patients had BMI less than 25 kg/$m^2$ and 33 (27.5%) had >27.5 kg/$m^2$.

TABLE 6: BMI OF THE PATIENTS

| **BMI (Kg/$M^2$)** | FEMALE | MALE | Total |
|---|---|---|---|
| <25 | 18 | 10 | 28 |
| 25.1-27.5 | 40 | 19 | 59 |
| >27.5 | 19 | 14 | 33 |
| Total | 77 | 43 | 120 |

FIGURE 4: BMI OF THE PATIENTS



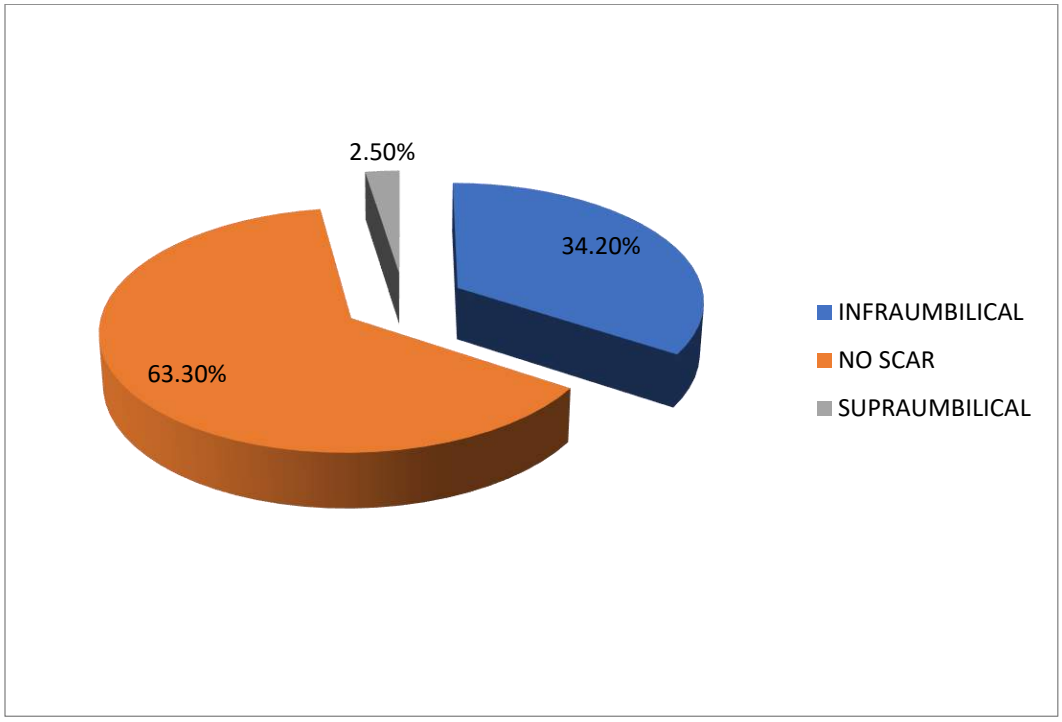
**ABDOMINAL SCAR IN CASES**

Among 120 patients, 44 (36.7%) had history of previous abdominal surgery. Out of which 3(2.5%) had supraumbilical and 41(34.2%) had infraumbilical scar.

TABLE 7: ABDOMINAL SCAR IN PATIENTS

| ABDOMINAL SCAR | No. of cases | Percentage |
|---|---|---|
| NO SCAR | 76 | 63.3% |
| INFRAUMBILICAL | 41 | 34.2% |
| SUPRAUMBILICAL | 3 | 2.5% |
| Total | 120 | 100.0% |

FIGURE 5: ABDOMINAL SCAR IN PATIENTS



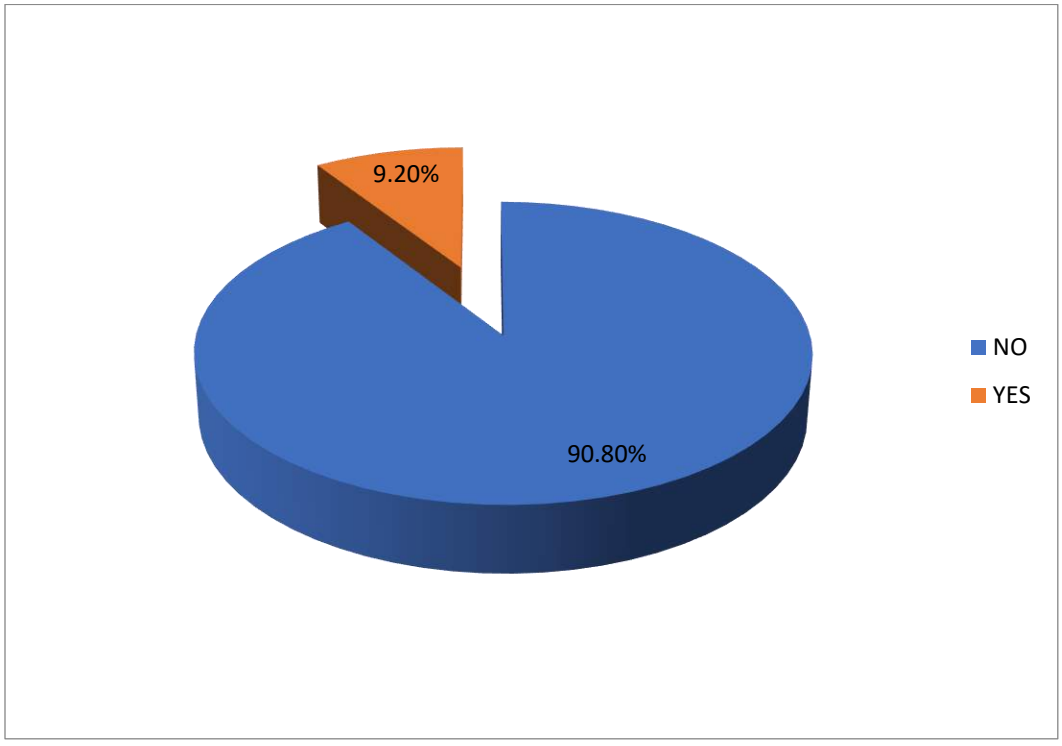
## PALPABLE GALL BLADDER

In our study only 11 (9.2%) patients had palpable gall bladder on abdominal examination.

TABLE 8: PALPABLE GALL BLADDER

| Palpable GB | No. of cases | Percentage |
|---|---|---|
| NO | 109 | 90.8% |
| YES | 11 | 9.2% |
| Total | 120 | 100.0% |

FIGURE 6: PALPABLE GALL BLADDER



**ULTRASONOGRAPHIC FINDINGS: GB WALL THICKNESS, PERICHOLECYSTIC COLLECTION & IMPACTED STONE.**

Ultrasound was done in all of these patients. Findings of GB wall thickness (>/<4mm), pericholecystic collection and impacted stone were noted.

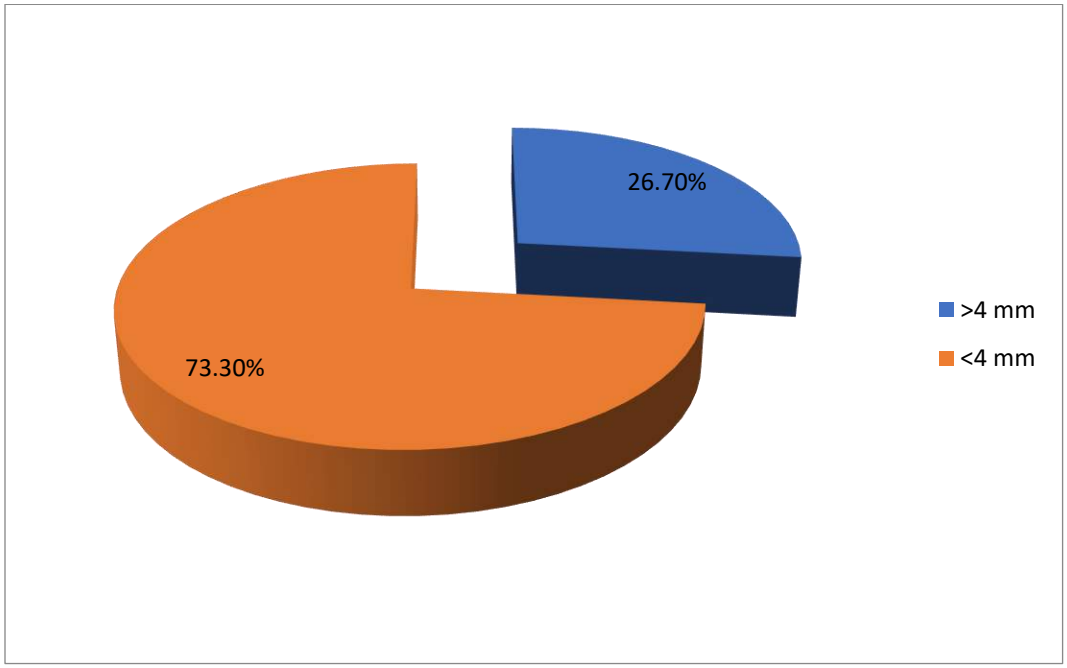
**GB WALL THICKNESS**:

Out of 120 patients, 32 (26.7%) had GB wall thickness more than 4 mm.

TABLE 9: THICKNESS OF GALL BLADDER

| GB Wall Thickness | No. of cases | Percentage |
|---|---|---|
| <4 mm | 88 | 73.3% |
| >4 mm | 32 | 26.7% |
| Total | 120 | 100.0% |

FIGURE 7: THICKNESS OF GALL BLADDER



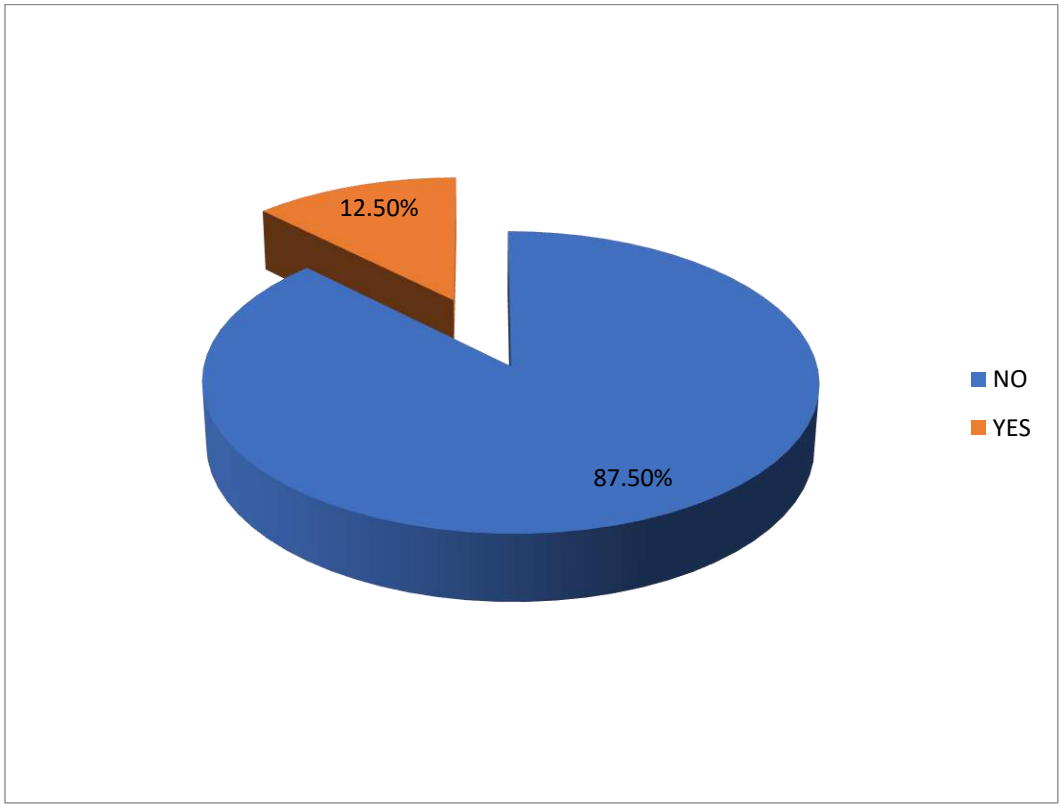
**PERICHOLECYSTIC COLLECTION**

Only 15 (12.5%) had pericholecystic collection on USG.

TABLE 10: PERICHOLECYSTIC COLLECTION

| Pericholecystic Collection | No. of cases | Percentage |
|---|---|---|
| NO | 105 | 87.5% |
| YES | 15 | 12.5% |
| Total | 120 | 100.0% |

FIGURE 8: PERICHOLECYSTIC COLLECTION



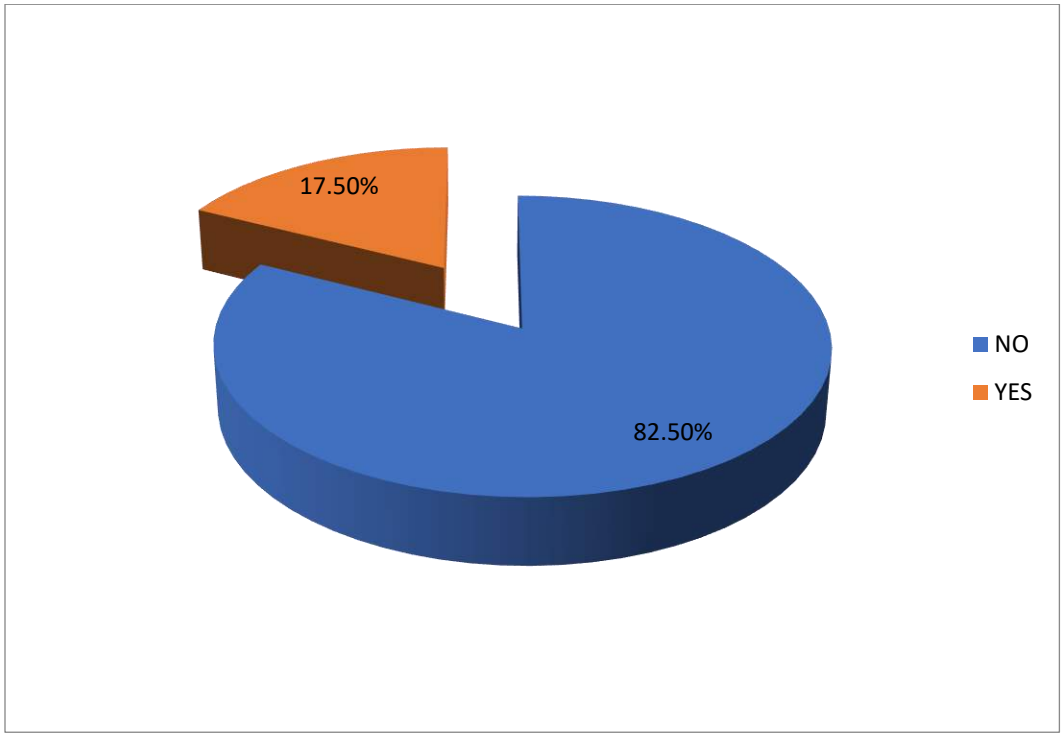
**IMPACTED STONE**

21 (17.5%) patients had impacted stone on USG.

TABLE 11: IMPACTED STONE

| Impacted stone | No. of cases | Percentage |
|---|---|---|
| NO | 99 | 82.5% |
| YES | 21 | 17.5% |
| Total | 120 | 100.0% |

FIGURE 9: IMPACTED STONE



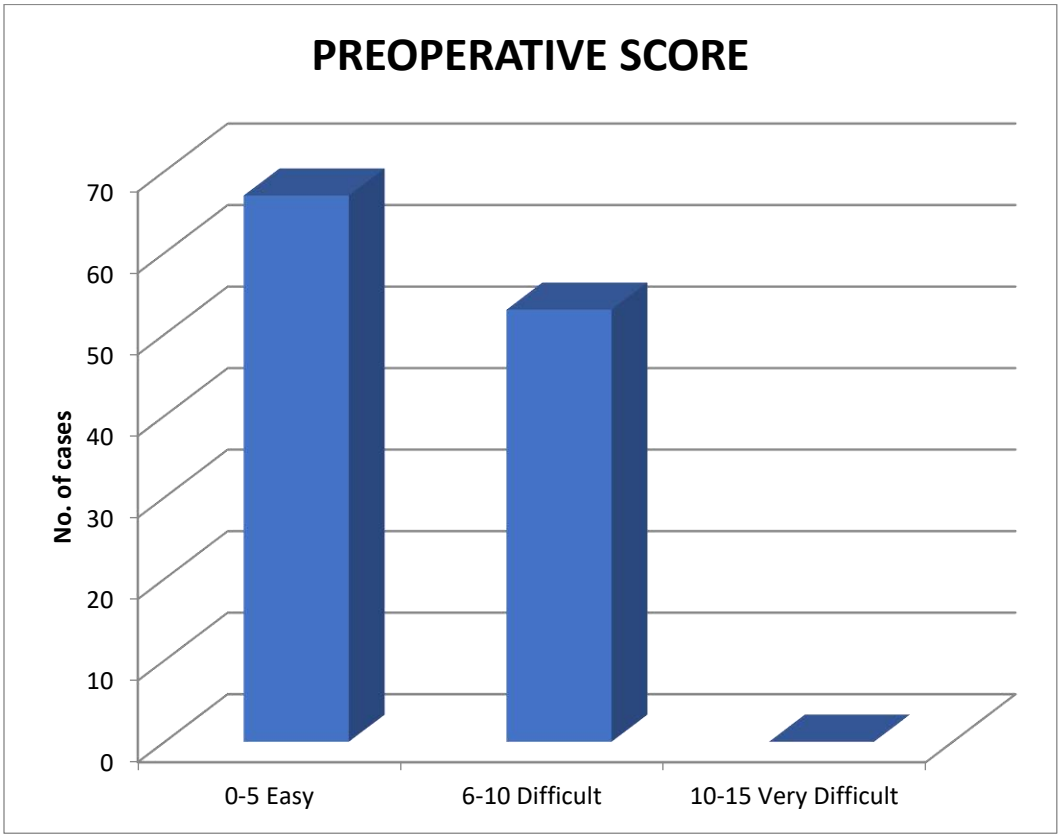
**PREOPERATIVE EVALUATION**

Out of 120 patients, 67 were scored < 5 (easy), 53 were scored >5 (difficult) and none of them were scored very difficult.

TABLE 12: PREOPERATIVE SCORE

| PREOPEERATIVE SCORE | 0-5 | 6-10 | 10-15 |
|---|---|---|---|
| NUMBER OF CASSES | 67 | 53 | NIL |
| PREDICTION | EASY | DIFF | NIL |

FIGURE 10: PREOPERATIVE SCORE



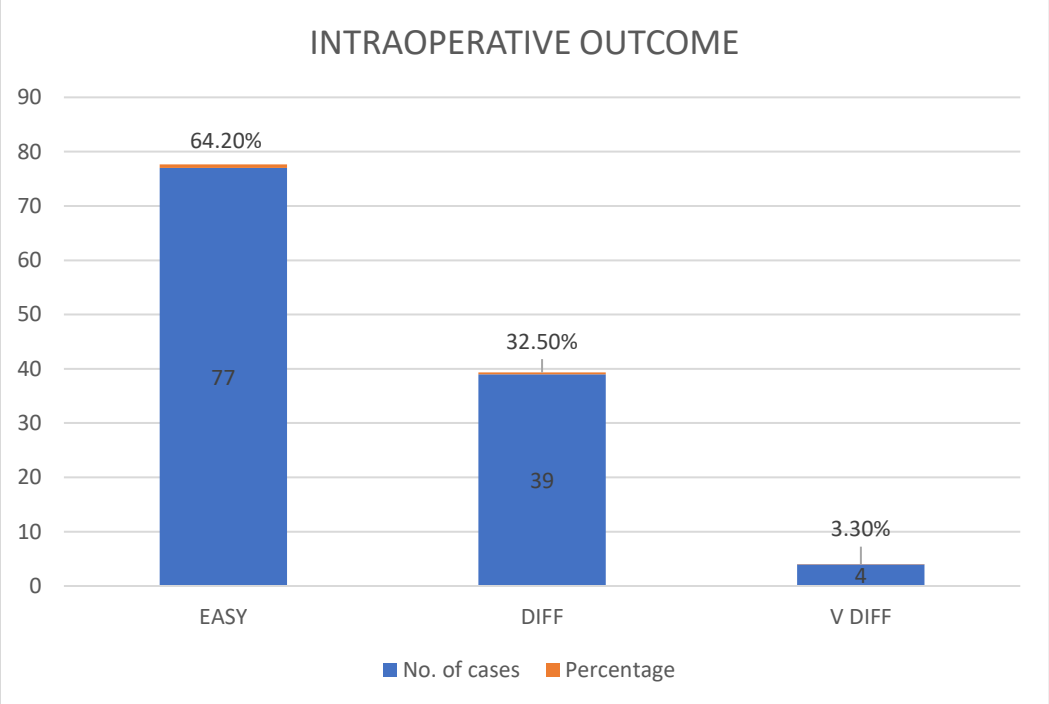
**INTRAOPERATIVE OUTCOME**

Out of 120 patients, 77 cases were easy. 39 were difficult and 4 were converted to open cholecystectomy from laparoscopic cholecystectomy.

TABLE 13: INTRAOPERATIVE OUTCOME

| INTRA OPERATIVE OUTCOME | No. of cases | Percentage |
|---|---|---|
| DIFF | 39 | 32.5% |
| EASY | 77 | 64.2% |
| V DIFF | 4 | 3.3% |
| Total | 120 | 100.0% |

FIGURE 11: INTRAOPERATIVE OUTCOME



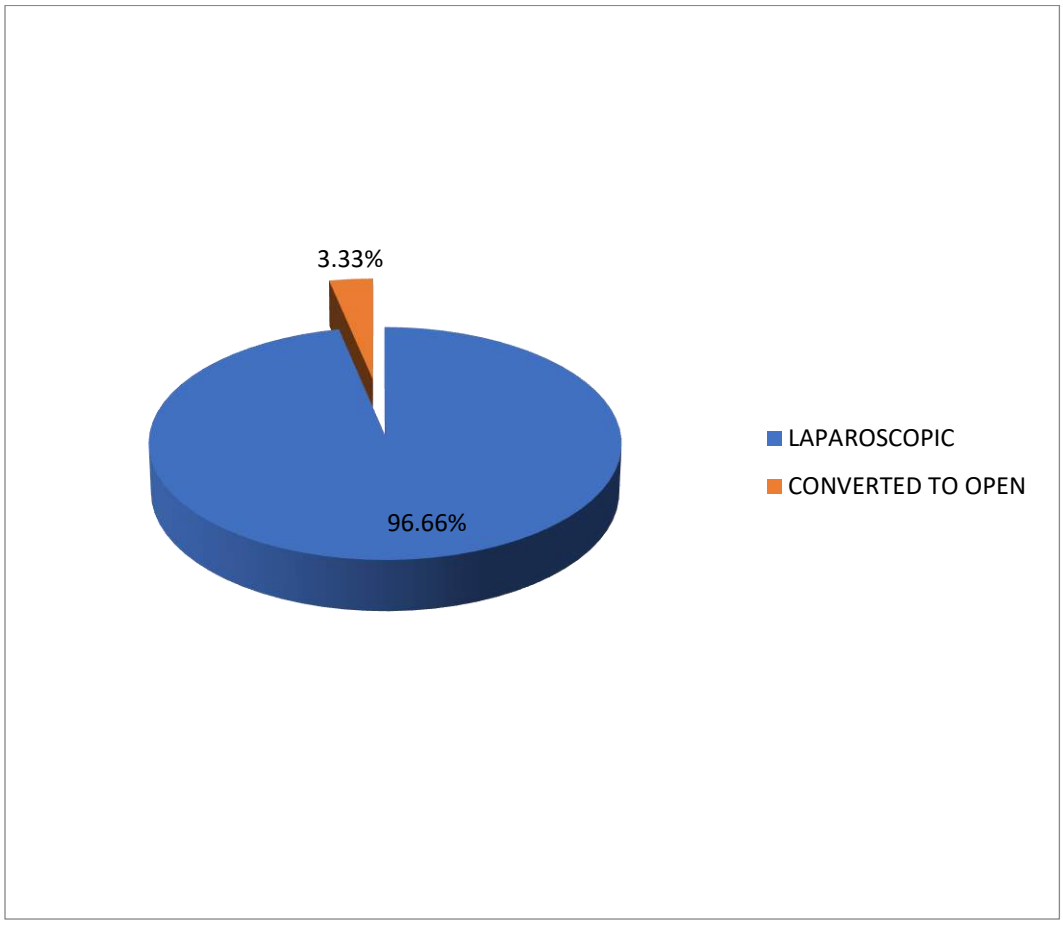
**LAPAROSCOPY CONVERTED TO OPEN**

Out of 120 patients, 4 cases were converted to open cholecystectomy from laparoscopic cholecystectomy**.**

TABLE 14: CASES CONVERTED FROM LAPAROSCOPY TO OPEN

| LAPAROSCOPIC | CONVERTED TO OPEN |
|---|---|
| 116 (96.66%) | 4 (3.33%) |

FIGURE 12: CASES CONVERTED FROM LAPAROSCOPY TO OPEN



**COMPARISION OF PREOP SCORE AND SURGICAL OUTCOME**

TABLE 15: CORELATION BETWEEN PREOP SCORE AND INTRAOP OUTCOME

| | | **INTRA OPERATIVE OUTCOME** | | | | **Total** | **Chi-square value** | **p-value** |
|---|---|---|---|---|---|---|---|---|
| | | **EASY** | | **DIFFICULT** | | | | |
| Total Score | < 5 | 64 (TN) | 83.1% | 3 (FN) | 7.0% | 67 | 64.866 | 0.000 |
| | > 5 | 13 (FP) | 16.9% | 40 (TP) | 93.0% | 53 | | |
| Total | | 77 | 100.0% | 43 | 100.0% | 120 | | |

Out of 67 patients based on preop score 0-5 (predicted easy), 64 were found EASY during intraop i.e. True Negative.

Out of 67 patients based on preop score 0-5 (predicted easy), 3 were found DIFFICULT during intraop .i.e. False negative.

Out of 53 patients based on preop score 5-10 (predicted difficult), 13 were found EASY during intraop .i.e. False positive.

Out of 53 patients based on preop score 5-10 (predicted difficult), 40 were found difficult during intraop .i.e. True positive.

FIGURE 13: ROC CURVE

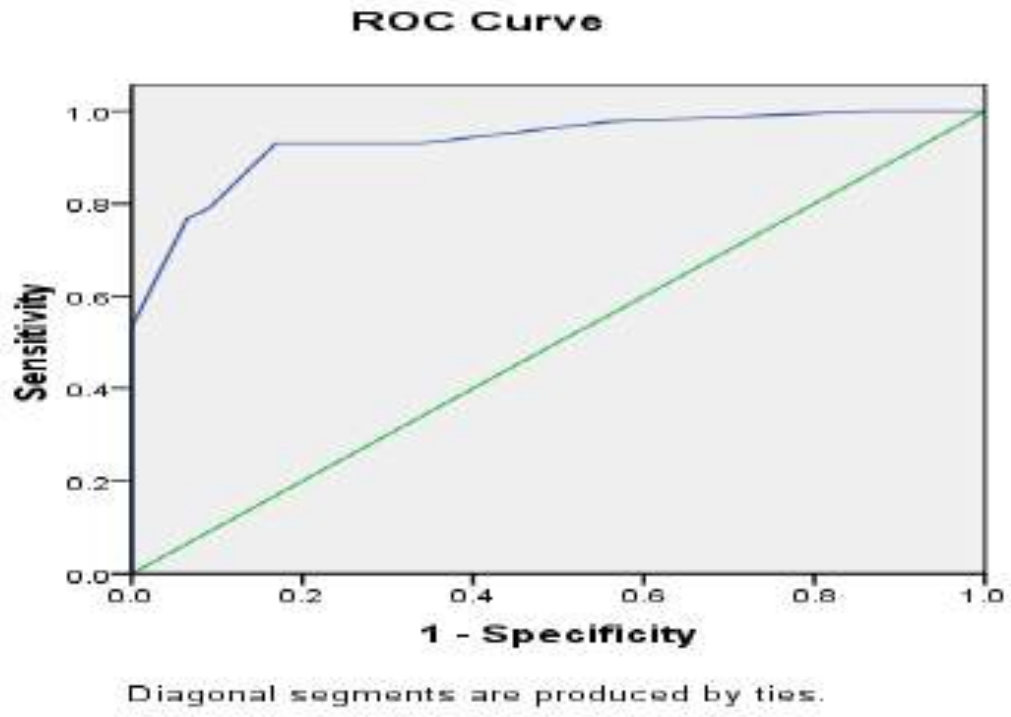



TABLE 16: AREA UNDER THE CURVE

Test Result Variable(s): total Score

| Area | Std. Error[a] | p-value | Asymptotic 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 0.935 | 0.024 | 0.001 | 0.888 | 0.983 |

ROC analysis was done. Area Under ROC curve was 0.935 with 95% confidence interval (0.888 TO 0.983).

Scoring system was found to be effective with sensitivity of 93.02 % & specificity of 83.12% at score more than 5 in predicting difficult laparoscopic cholecystectomy

## COMPARISION OF PREOP SCORING FACTORS AND SURGICAL OUTCOME

TABLE 17: UNIVARIATE ANALYSIS OF PREOP SCORING FACTORS AND SURGICAL OUTCOME*

| | | INTRA OPERATIVE OUTCOME | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|---|
| | | EASY | | DIFF / V DIFF | | | | |
| Age group | < 30 | 16 | 20.8% | 1 | 2.3% | 17 | 24.079 | 0.000 |
| | 31-40 | 24 | 31.2% | 7 | 16.3% | 31 | | |
| | 41-50 | 17 | 22.1% | 6 | 14.0% | 23 | | |
| | 51-60 | 11 | 14.3% | 13 | 30.2% | 24 | | |
| | > 60 | 9 | 11.7% | 16 | 37.2% | 25 | | |
| Age group | < 50 | 55 | 71.4% | 14 | 32.6% | 69 | 17.059 | 0.000 |
| | > 50 | 22 | 28.6% | 29 | 67.4% | 51 | | |
| Sex | F | 55 | 71.4% | 22 | 51.2% | 77 | 4.928 | 0.026 |
| | M | 22 | 28.6% | 21 | 48.8% | 43 | | |
| H/O hospitalization | NO | 72 | 93.5% | 9 | 20.9% | 81 | 66.249 | 0.000 |
| | YES | 5 | 6.5% | 34 | 79.1% | 39 | | |
| BMI SCORE | 0 | 24 | 31.2% | 4 | 9.3% | 28 | 17.476 | 0.000 |
| | 1 | 41 | 53.2% | 18 | 41.9% | 59 | | |
| | 2 | 12 | 15.6% | 21 | 48.8% | 33 | | |
| ABDOMINAL SCAR SCORE | NO SCAR | 50 | 64.9% | 26 | 60.5% | 76 | 5.510 | 0.064 |
| | INFRAUMBILICAL | 27 | 35.1% | 14 | 32.6% | 41 | | |
| | SUPRAUMBILICAL | 0 | 0.0% | 3 | 7.0% | 3 | | |
| Palpable GB score | No | 67 | 87.0% | 42 | 97.7% | 109 | 3.767 | 0.095 |
| | Yes | 10 | 13.0% | 1 | 2.3% | 11 | | |
| GB Wall Thickness SCORE | <4 | 53 | 68.8% | 35 | 81.4% | 88 | 2.227 | 0.136 |
| | > 4 | 24 | 31.2% | 8 | 18.6% | 32 | | |
| Pericholecystic Collection SCORE | No | 70 | 90.9% | 35 | 81.4% | 105 | 2.283 | 0.131 |
| | Yes | 7 | 9.1% | 8 | 18.6% | 15 | | |
| Score of impacted stone | No | 65 | 84.4% | 34 | 79.1% | 99 | 0.546 | 0.460 |
| | Yes | 12 | 15.6% | 9 | 20.9% | 21 | | |
| Expected outcome | DIFF | 7 | 9.1% | 34 | 79.1% | 41 | 60.071 | 0.001 |
| | EASY | 70 | 90.9% | 9 | 20.9% | 79 | | |
| Total | | 77 | 100.0% | 43 | 100.0% | 120 | | |

(*merging the final outcome of difficult and very difficult).

Table 17 shows the univariate analysis of preoperative risk factors with surgical outcome. Advanced age (>50years) with p-value 0.001, previous history of hospitalization for acute cholecystitis (p-value 0.001), BMI >27.5 kg/$m^2$ (p-value 0.001) and male sex (p-value 0.026) were found to be significant contributing factors in predicting difficult laparoscopic cholecystectomy.

Logistic regression was done for the parameters which were found significant on univariate analysis.

## MULTIVARIATE ANALYSIS OF RISK FACTORS WITH SURGICAL OUTCOME

TABLE 18: MULTIVARIATE ANALYSIS OF INTRAOPERATIVE OUTCOME WITH RISK FACTORS

| | **p-value** | **Exp(B)** | **95% C.I.for EXP(B)** | |
|---|---|---|---|---|
| | | | **Lower** | **Upper** |
| Age > 50 | 0.035 | 4.506 | 1.111 | 18.285 |
| Sex _male | 0.666 | 0.736 | 0.183 | 2.960 |
| H/O hospitalization | 0.000 | 154.672 | 23.871 | 1002.179 |
| BMI SCORE | 0.002 | | | |
| BMI SCORE(1) | 0.481 | 2.013 | 0.288 | 14.083 |
| BMI SCORE(2) | 0.002 | 37.099 | 3.883 | 354.437 |

On multivariate analysis past History of hospitalization with p-value 0.001, BMI >27.5kg/$m^2$ with p-value 0.002 (difficulty level increases with increasing BMI) and Advanced age (>50 years) with p-value 0.035 were found statistically significant.

## ANALYSIS OF PREOPERATIVE RISK FACTORS IN PREDICTING VERY DIFFICULT OUTCOME

TABLE 19: UNIVARIATE ANALYSIS OF PREOPERATIVE RISK FACTORS WITH SURGICAL OUTCOME (VERY DIFFICULT)

| | | **INTRA OPERATIVE OUTCOME** | | | | | **Chi-square value** | **p-value** |
|---|---|---|---|---|---|---|---|---|
| | | **EASY/DIFF** | | **VERY DIFF** | | **Total** | | |
| Age group1 | < 30 | 17 | 14.7% | 0 | 0.0% | 17 | 7.192 | 0.207 |
| | 31-40 | 31 | 26.7% | 0 | 0.0% | 31 | | |
| | 41-50 | 23 | 19.8% | 0 | 0.0% | 23 | | |
| | 51-60 | 22 | 19.0% | 2 | 50.0% | 24 | | |
| | > 60 | 23 | 19.8% | 2 | 50.0% | 18 | | |
| Age group | < 50 | 71 | 61.2% | 0 | 0.0% | 71 | 5.996 | 0.026 |
| | > 50 | 45 | 38.8% | 4 | 100.0% | 49 | | |
| Sex | F | 75 | 64.7% | 2 | 50.0% | 77 | 0.361 | 0.617 |
| | M | 41 | 35.3% | 2 | 50.0% | 43 | | |
| H/O hospitalization | NO | 81 | 69.8% | 0 | 0.0% | 81 | 8.594 | 0.010 |
| | YES | 35 | 30.2% | 4 | 100.0% | 39 | | |
| BMI SCORE | 0 | 28 | 24.1% | 0 | 0.0% | 28 | 1.728 | 0.422 |
| | 1 | 57 | 49.1% | 2 | 50.0% | 59 | | |
| | 2 | 31 | 26.7% | 2 | 50.0% | 33 | | |
| ABDOMINAL SCAR | INFRAUMBILICAL | 39 | 33.6% | 2 | 50.0% | 41 | 9.643 | 0.008 |
| | NO SCAR | 75 | 64.7% | 1 | 25.0% | 76 | | |
| | SUPRAUMBILICAL | 2 | 1.7% | 1 | 25.0% | 3 | | |
| Palpable GB | NO | 105 | 90.5% | 4 | 100.0% | 109 | 0.418 | 0.518 |
| | YES | 11 | 9.5% | 0 | 0.0% | 11 | | |
| GB Wall Thickness | <4 | 84 | 72.4% | 4 | 100.0% | 88 | 1.505 | 0.573 |
| | > 4 | 32 | 27.6% | 0 | 0.0% | 32 | | |
| Pericholecystic Collection | NO | 101 | 87.1% | 4 | 100.0% | 105 | 0.591 | 0.442 |
| | YES | 15 | 12.9% | 0 | 0.0% | 15 | | |
| impacted stone | NO | 95 | 81.9% | 4 | 100.0% | 99 | 0.878 | 0.349 |
| | YES | 21 | 18.1% | 0 | 0.0% | 21 | | |

Table 19 shows the comparison of preop risk factors and very difficult surgical outcome.

Total 4 cases were found very difficult in our study. All these cases were predicted as difficult on preoperative scoring system. It shows scoring system was not able to differentiate between difficult and very difficult outcome.

Abdominal Scar with p-value 0.008, history of hospitalization with p-value 0.010 and advance age (>50years) with p-value 0.026 were found to be significantly contributing in predicting the very difficult outcome of surgery.

# DISCUSSION

Laparoscopic Cholecystectomy (LC) is considered as the gold standard treatment of symptomatic cholelithiasis[19,20]. It is important to predict difficult LC preoperatively so that senior surgeons can be requested to be present during surgery rather than less experienced junior surgeons prolonging the surgery which may lead to intraoperative complications. Preoperatively predicted difficult cases require an early decision of conversion that can be made to avoid unnecessarily prolonging the surgery and to prevent complications that may increase the patient hospital stay and costs, also reducing perioperative complications which is a desirable objective for quality-improvement and patient safety.

Many studies has been done in the past in predicting difficult laparoscopic cholecystectomy. Randhawa and Pujahari[21] came up with a systemic scoring system to predict the level of difficulty in laparoscopic cholecystectomy. This scoring system takes into account the demographic factors like age, gender, hospitalization history for acute cholecystitis, clinical factors like BMI, presence of abdominal scar, palpability of gall bladder and sonographic features like wall thickness, pericholecystic collection and impacted stone as the predictors of difficulty.

In present study, we have evaluated this preoperative scoring system considering various pre-operative factors in elective/interval laparoscopic cholecystectomy. We also made an attempt to study the contribution of scoring factors in predicting difficult Laparoscopic cholecystectomy.

Our study conducted in a tertiary care hospital in North India. The observations, results and statistical data obtained were also compared with previous published literature.

**AGE OF INCIDENCE**

In present study, 31-40 years were most common age group undergoing laparoscopic cholecystectomy. In general most studies suggest a predominance of middle age group as the representative age domain. In Studies by Basim Rassam Ghadhban [41], Tripathi & Nisar Ahmad study [42]

and V. Singh & Abdul Nasser[43] 31-40 years was the most common age group undergoing laparoscopic cholecystectomy. Whereas other studies Herman's et al. [44] and Hanif et al.[45] showed the peak incidence in age group of 51-60 years and 41-50 years respectively. In our study, age of patients ranged from 17 to 85 years with mean age of 46.47 with S.D- 15.07. Studies by Sakpal vijay et al.[28] and Ahmed S. Elgammal et al.[32] shows Advanced age makes (LC) difficult. study by Kanaan et al.[46] shows Conversion to open laparoscopic cholecystectomy is higher with increasing age. In our study, advanced age >50 years was found to be statistically significant (p value <0.035) contributing factor in predicting difficult laparoscopic cholecystectomy.

**DISTRIBUTION OF CASES BY GENDER**

In our study, out of 120 patients 77 (64.2%) were females and 43 (35.8%) were male patients. In most studies sample population is dominated by females [21].

TABLE 20: GENDER COMPARISON STUDY

| Gender distribution | Randhawa & pujahari[21] | % | Tripathi and Nisar Ahmed[42] | % | Present study | % |
|---|---|---|---|---|---|---|
| Male | 80 | 35.087 | 90 | 60.0 | 43 | 35.8 |
| female | 148 | 64.912 | 60 | 40.0 | 77 | 64.2 |

Study by Heng-Hui Len et al.[47] and Hussain A et al.[48] shows male sex as statistically significant factor associated with difficulty in LC. Conversion rate and significantly higher mortality also reported with male sex in study by John C. Russell [49]. In our study male sex was statistically significant factor in causing difficult laparoscopic cholecystectomy on univariate analysis (p value 0.026), but not on multivariate Analysis (p value 0.666).

**DISTRIBUTION OF CASES BY BMI**

In current study patients with BMI more than 27.5 kg/m2 were significantly (p-value 0.002) associated with difficult laparoscopic cholecystectomy.

Other studies by Liu, C L et al. [50] in 1996 and in 2011 Hussain A, et al.[51], et al have also linked obesity to difficulty in laparoscopic cholecystectomy. Michael Rosen, Fred Brody, Jeffrey Ponsky[52] found in their series that obesity as independent predicting factor causing conversion to open cholecystectomy in patients with acute cholecystitis.

**PAST HISTORY OF HOSPITALIZATION**

In our study 39 (32.5%) patients, among 120 had past history of hospitalization for acute cholecystitis. It was statistically significant (p value 0.001) in predicting the difficulty in LC in our study.

Similar findings seen in Studies by Ahmed S. Elgammal et al.[32],Ashish K. Khetan [53] showing statistically strong relation between past history of hospitalization for acute cholecystitis and difficult LC.

**ABDOMINAL SCAR IN CASES**

In the present study 44 patients had abdominal scar mainly lower abdominal. We did not find any significant association between abdominal scar and difficult Laparoscopic cholecystectomy.

Whereas study by Tripathi et al.[42] and Mohanapriya Thyagarajan et al.[54] shows presence of abdominal scar as statistically significant factor in predicting difficult LC.

**PALPABLE GALLBLADDER**

In present study only 11 (9.2%) patients had palpable gall bladder and all had easy LC, turned out to be statistically insignificant.

Where as in study by Randhawa and Pujahari[21], clinically palpable gall bladder was found to be a predictor of difficult laparoscopic cholecystectomy. In our study it could be due to less number of patients having palpable gall bladder in present study. There are less number of studies supporting clinically palpable gallbladder as a predictor of difficult LC.

**GALLBLADDER WALL THICKNESS**

In our study 32 (26.7%) patients had GB wall thickness more than 4 mm. it was not statistically a significant factor in predicting difficult LC (p-value 0.136).

Whereas Gupta, Nikhil et al.[37] and Nidoni R, Udachan et al. [55] have found thick gall bladder wall associated with difficult cholecystectomy.

**PERICHOLECYSTIC COLLECTION AND IMPACTED STONE**

Both these ultrasonographic findings shows the acuteness of the condition, but these were not found to be clinically significant in our study. Whereas other studies suggest their association with difficult LC.

Study by Dhanke PS, Ugane et al.[56] shows link between difficult LC and Pericholecystic collection. Study by Nikhil et al.[37] shows link between difficult LC and impacted stone.

**EVALUATION OF THE PREDICTIVE FACTORS FOR DIFFICULT CHOLECYSTECTOMY:**

The preoperative parameters were analyzed with operative parameters. Initially univariate Analysis was done and statistically significant factors were found, followed by multivariate analysis.

In present study, we evaluated the performance of the scoring system and it was found to be 93.02% sensitive and 83.12% specific in predicting difficult LC.

**LAPAROSCOPY CONVERSION TO OPEN**

In our study, Out of 120 patients, 4 (3.33%) cases were converted to open cholecystectomy from laparoscopic cholecystectomy. In present study conversion rate is comparable with most of other series reported (table 21).

TABLE 21: COMPARISON OF CONVERSION RATE OF DIFFERENT STUDIES

| Series and year | Conversion rate |
|---|---|
| present study (2022) | 3.33% |
| Randhawa & Pujahari[21] (2009) | 1.315% |
| C. Simopoulos[33] et al. (2005) | 5.2% |
| Micheal Rosen[52] et al. (2002) | 5.3% |
| Kama et al.[30] (2001) | 4.8% |

All the cases found very difficult were predicted as difficult during prediction. So this scoring system was not able to differentiate between difficult and very difficult prediction.

**EFFICACY OF SCORING SYSTEM AND SIGNIFICANT CONTRIBUTORS OF DIFFICULT OUTCOME**

In present study, scoring system given by Randhawa and Pujahari was 93.02% sensitive and 83.12% specific in predicting difficult laparoscopic cholecystectomy with overall diagnostic accuracy of 86.67%. Another study by Randhawa and Pujahari[21] in 2009 on this scoring system had 75.00% sensitivity & 90.24 % specificity in predicting difficult outcome. Which is comparable to our study.

In our study, for prediction of difficult cases past history of hospitalization for acute cholecystitis (p-value 0.001), BMI >27.5 kg/m2 (p-value 0.002) and advanced age (>50years) with p-value 0.035 were significant contributing factors. In study by Randhawa and Pujahari[21] significant contributor of difficult outcome were history of hospitalization for acute cholecystitis (p-value 0.001), BMI>27.5 kg/m2 (p-value0 0.010) and palpable gall bladder (p-value 0.022).

In our study, this Scoring system was not able to identify the very difficult cases on preoperative prediction. This scoring system has missed 5.7% very difficult cases in study by Gupta et al.[37] & in 4.5 % cases in study by Tripathi et al[42]. Thus raising the question mark over the criteria used for differentiation in this scoring system.

In our study, for prediction of very difficult cases Abdominal scar (p-value 0.008), past history of hospitalization for acute cholecystitis (p-value 0.010) and Advanced age (>50years) with p-value 0.026 were significantly

contributing factors.  Where was in study by Tripathi et al.[42] only history of Hospitalization and Abdominal scar were significant contributor.

# SUMMARY

Within a short period of merely two decades since its introduction, Laparoscopic cholecystectomy has become widely accepted as the procedure of choice for symptomatic gall bladder disease. With their growing experience in this surgery, the surgeons have started taking up more complex cases and high risk patients, some of which were considered relative contraindications a couple of years back. Thus with wider application of laparoscopy for technically difficult and high risk patients it was expected that the complication rates would rise as also the rate of conversion to open cholecystectomy. Although few of the patients require conversion to open cholecystectomy for various reasons but irrespective of this morbidity and mortality statistics do still favor laparoscopic cholecystectomy over open cholecystectomy.

Different examination standards were used and an effort to determine the factors which help to predict the difficult laparoscopic cholecystectomy has been tried. The present study is a continuation of that effort. An attempt has been made to evaluate the preoperative scoring system proposed by Randhawa & Pujahari in predicting the difficult laparoscopic cholecystectomy. We have also tried to look at the contribution of scoring factors in predicting degree of difficulty. Pre-operative prediction of a difficult laparoscopic cholecystectomy not only helps patient counselling but also helps the surgeon to prepare better for the intraoperative risk and the technical difficulties expected to be encountered.

The following risk factors were considered – Advanced age (>50 years), male sex, history of prior hospitalization for gall stone disease, BMI, prior abdominal surgeries, gall bladder wall thickness, pericholecystic collection and impacted stone. Preop scoring was compared with intraoperative criteria i.e. time taken for surgery, injury to duct/ artery, bile spillage and conversion to open cholecystectomy. Both were correlated and this scoring system was evaluated for predicting degree of difficulty in laparoscopic cholecystectomy.

## CONCLUSION

From this study the following conclusions may be drawn.

- Gall stone disease mainly affect median age group with maximum incidence in the age of 31-40 years.
- Elderly patients are more likely to have a difficult LC.
- Females has higher incidence of symptomatic gall stone disease than males.
- Females undergo laparoscopic cholecystectomy more frequently, but males tend to have a higher number of difficult cases.
- Recurrent cholecystitis is a predictor of difficult LC.
- Obese patients (BMI >27.5 kg/$m^2$) tend to have more difficult LC.
- Previous abdominal surgery predisposes towards difficulties in cholecystectomy.
- The preoperative predicting score is 93.02% sensitive and 83.12% specific in predicting difficulty in Laparoscopic cholecystectomy.
- Advanced age (>50 years), male gender, past History of Hospitalization for acute cholecystitis and BMI (>27.5 kg/m2) are significant contributors in predicting difficult outcome of surgery.
- Scoring system is not able to differentiate the level of difficulty.
- In prediction of very difficult cases Previous Abdominal surgery, past History of hospitalization for acute cholecystitis and Advanced age are significant contributors.

This study demonstrates that preoperative scoring system is a good, statistically reliable and useful method to predict difficulty in laparoscopic cholecystectomy in majority of cases. It can help surgeons to get an idea of the potential difficulty to be faced in a particular patient. It can help in operative planning and the high risk patients may be informed accordingly.

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| Sr. No | MRD No | Name | Age | Age Score | Sex | H/O hospitaliz | Past history of hospitalization for gall stone disease SCORE | BMI | BMI SCORE | ABDOMINAL SCAR | ABDOMINAL SCAR SCORE | Palpable GB | Palpable GB score | GB Wall Thickness | GB Wall Thickness SCORE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 869581 | G K | 66 | 1 | F | NO | 0 | 24.8 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 2 | 848006 | S K | 38 | 0 | F | YES | 4 | 26.4 | 1 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 3 | 881090 | N G | 31 | 0 | F | NO | 0 | 27.2 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 4 | 888499 | S K | 36 | 0 | F | NO | 0 | 22.4 | 0 | NO SCAR | 0 | YES | 1 | <4 | 0 |
| 5 | 735224 | R R | 55 | 1 | F | YES | 4 | 27.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 6 | 882916 | S M | 55 | 1 | F | NO | 0 | 25.8 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 7 | 1086796 | H C | 51 | 1 | M | YES | 4 | 29.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 8 | 697989 | J S | 49 | 0 | M | NO | 0 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 9 | 938456 | M M | 47 | 0 | F | NO | 0 | 24.8 | 0 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 10 | 812369 | B S | 34 | 0 | M | NO | 0 | 27 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 11 | 880290 | A S | 39 | 0 | F | YES | 4 | 30 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 12 | 884902 | R M | 45 | 0 | F | NO | 0 | 24 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 13 | 888182 | R K | 38 | 0 | F | NO | 0 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 14 | 912899 | R K | 59 | 1 | F | NO | 0 | 29.6 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 15 | 919786 | C D | 57 | 1 | F | NO | 0 | 28.6 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 16 | 901466 | R K | 25 | 0 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 17 | 905883 | J K | 36 | 0 | F | YES | 4 | 25.2 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 18 | 906643 | R K | 32 | 0 | F | NO | 0 | 26 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 19 | 902359 | S D | 51 | 1 | F | YES | 4 | 28 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 20 | 929818 | G K | 36 | 0 | F | NO | 0 | 25.7 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 21 | 899150 | D M | 61 | 1 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 22 | 897937 | S K | 36 | 0 | F | NO | 0 | 26 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 23 | 917634 | H S | 47 | 0 | M | YES | 4 | 28.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 24 | 894214 | K K | 61 | 1 | F | NO | 0 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 25 | 870621 | P S | 40 | 0 | M | NO | 0 | 26.8 | 1 | NO SCAR | 0 | YES | 1 | >4 | 2 |
| 26 | 673930 | S K | 26 | 0 | M | NO | 0 | 24 | 0 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 27 | 883231 | S R | 66 | 1 | F | NO | 0 | 25.2 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 28 | 921244 | S S | 66 | 1 | M | YES | 4 | 26.8 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 29 | 900065 | H S | 65 | 1 | M | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 30 | 895613 | P K | 31 | 0 | F | NO | 0 | 25.6 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 31 | 895682 | M S | 29 | 0 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 32 | 853827 | M K | 42 | 0 | F | NO | 0 | 24.6 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 33 | 889594 | D K | 61 | 1 | F | YES | 4 | 28 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 34 | 904977 | K S | 38 | 0 | M | NO | 0 | 24.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 35 | 874303 | R S | 67 | 1 | M | YES | 4 | 28.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 36 | 897030 | R K | 61 | 1 | M | NO | 0 | 24.8 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 37 | 902848 | S B | 37 | 0 | F | NO | 0 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 38 | 877886 | A R | 65 | 1 | F | YES | 4 | 25.2 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 39 | 908907 | G S | 58 | 1 | M | YES | 4 | 26 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 40 | 881429 | B K | 64 | 1 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |

| Sr. No | MRD No | Pericholecystic Collection | Pericholecystic Collection SCORE | impacted stone | score of impacted stone | total Score | Expected outcome | TIME TAKEN | INJURY TO DUCT / ARTERY | BILE SPILLAGE | CONVESRION TO OPEN CHOLECYSTECTOMY | INTRA OPERATIVE OUTCOME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 869581 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 2 | 848006 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 3 | 881090 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 4 | 888499 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 5 | 735224 | NO | 0 | YES | 1 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 6 | 882916 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 7 | 1086796 | NO | 0 | NO | 0 | 8 | DIFF | >120 | NO | NO | YES | V DIFF |
| 8 | 697989 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 9 | 938456 | YES | 1 | YES | 1 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 10 | 812369 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 11 | 880290 | NO | 0 | YES | 1 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 12 | 884902 | NO | 0 | NO | 0 | 0 | EASY | <60 | NO | NO | NO | EASY |
| 13 | 888182 | NO | 0 | YES | 1 | 3 | EASY | 60-120 | NO | NO | NO | DIFF |
| 14 | 912899 | YES | 1 | NO | 0 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 15 | 919786 | NO | 0 | YES | 1 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 16 | 901466 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 17 | 905883 | NO | 0 | NO | 0 | 7 | DIFF | <60 | NO | NO | NO | EASY |
| 18 | 906643 | NO | 0 | YES | 1 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 19 | 902359 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | YES | V DIFF |
| 20 | 929818 | NO | 0 | YES | 1 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 21 | 899150 | YES | 1 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 22 | 897937 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 23 | 917634 | YES | 1 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 24 | 894214 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 25 | 870621 | YES | 1 | YES | 1 | 7 | DIFF | <60 | NO | NO | NO | EASY |
| 26 | 673930 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 27 | 883231 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 28 | 921244 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | YES | V DIFF |
| 29 | 900065 | YES | 1 | NO | 0 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 30 | 895613 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 31 | 895682 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 32 | 853827 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 33 | 889594 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 34 | 904977 | NO | 0 | YES | 1 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 35 | 874303 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 36 | 897030 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 37 | 902848 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 38 | 877886 | YES | 1 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 39 | 908907 | NO | 0 | NO | 0 | 9 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 40 | 881429 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |

| Sr. No | MRD No | Name | Age | Age Score | Sex | H/O hospitaliz | Past history of hospitalization for gall stone disease SCORE | BMI | BMI SCORE | ABDOMINAL SCAR | ABDOMINAL SCAR SCORE | Palpable GB | Palpable GB score | GB Wall Thickness | GB Wall Thickness SCORE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 911357 | C K | 56 | 1 | F | NO | 0 | 25.4 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 42 | 911436 | A K | 55 | 1 | M | YES | 4 | 27.2 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 43 | 910573 | S S | 62 | 1 | F | NO | 0 | 26 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 0 | 911321 | J K | 55 | 1 | F | YES | 4 | 25.3 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 45 | 913047 | S L | 52 | 1 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 46 | 913046 | V S | 47 | 0 | F | NO | 0 | 23.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 47 | 693419 | P S | 55 | 1 | M | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 48 | 738309 | S R | 44 | 0 | F | NO | 0 | 27.2 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 49 | 858801 | R R | 28 | 0 | F | NO | 0 | 24 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 50 | 921009 | B S | 45 | 0 | M | YES | 4 | 30 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 51 | 921736 | B S | 62 | 1 | M | YES | 4 | 29.4 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 52 | 887610 | H B | 45 | 0 | F | NO | 0 | 25.6 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 53 | 912188 | R S | 27 | 0 | M | NO | 0 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 54 | 906432 | P D | 85 | 1 | F | YES | 4 | 27.2 | 1 | SUPRAUMBILICAL | 2 | NO | 0 | <4 | 0 |
| 55 | 865717 | P K | 24 | 0 | F | NO | 0 | 25.2 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 56 | 924045 | G K | 70 | 1 | F | YES | 4 | 28.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 57 | 930175 | Y K | 42 | 0 | F | NO | 0 | 26.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 58 | 916720 | P S | 31 | 0 | F | NO | 0 | 27 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 59 | 118482 | R S | 46 | 0 | M | YES | 4 | 26 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 60 | 878963 | K K | 24 | 0 | F | NO | 0 | 25.3 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 61 | 564198 | S R | 56 | 1 | F | NO | 0 | 26 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 62 | 918340 | S K | 42 | 0 | F | NO | 0 | 28 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 63 | 916614 | S S | 70 | 1 | M | YES | 4 | 26 | 1 | NO SCAR | 0 | N0 | 0 | <4 | 0 |
| 64 | 921009 | B S | 45 | 0 | M | YES | 4 | 28 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 65 | 921736 | B S | 62 | 1 | M | YES | 4 | 28.7 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 66 | 698328 | M C | 44 | 0 | F | NO | 0 | 27.3 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 67 | 922241 | P S | 53 | 1 | M | NO | 0 | 26.9 | 1 | NO SCAR | 0 | YES | 1 | <4 | 0 |
| 68 | 855295 | R K | 59 | 1 | M | NO | 0 | 24.9 | 0 | NO SCAR | 0 | YES | 1 | <4 | 0 |
| 69 | 919786 | C D | 57 | 1 | F | YES | 4 | 24.4 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 70 | 825910 | P K | 25 | 0 | F | NO | 0 | 24.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 71 | 857580 | L C | 17 | 0 | F | YES | 4 | 24.2 | 0 | NO SCAR | 0 | YES | 1 | <4 | 0 |
| 72 | 662477 | A K | 50 | 0 | M | NO | 0 | 26.9 | 1 | NO SCAR | 0 | YES | 1 | >4 | 2 |
| 73 | 921244 | S K | 65 | 1 | M | YES | 4 | 28.4 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 74 | 929836 | P K | 54 | 1 | F | NO | 0 | 23.5 | 0 | NO SCAR | 0 | YES | 1 | >4 | 2 |
| 75 | 8988 | B K | 41 | 0 | F | NO | 0 | 28.6 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 76 | 936663 | R K | 52 | 1 | M | NO | 0 | 27.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 77 | 934602 | J A | 22 | 0 | F | NO | 0 | 28.1 | 2 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 78 | 13777 | G K | 28 | 0 | F | NO | 0 | 28.6 | 2 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 79 | 331857 | A K | 41 | 0 | M | YES | 4 | 27 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 80 | 938205 | H S | 20 | 0 | M | NO | 0 | 24.9 | 0 | NO SCAR | 0 | YES | 1 | <4 | 0 |

| Sr. No | MRD No | Pericholecystic Collection | Pericholecystic Collection SCORE | impacted stone | score of impacted stone | total Score | Expected outcome | TIME TAKEN | INJURY TO DUCT / ARTERY | BILE SPILLAGE | CONVESRION TO OPEN CHOLECYSTECTOMY | INTRA OPERATIVE OUTCOME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 911357 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 42 | 911436 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 43 | 910573 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 0 | 911321 | NO | 0 | NO | 0 | 7 | DIFF | <60 | NO | NO | NO | EASY |
| 45 | 913047 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 46 | 913046 | NO | 0 | YES | 1 | 2 | EASY | 60-120 | NO | NO | NO | DIFF |
| 47 | 693419 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 48 | 738309 | NO | 0 | YES | 1 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 49 | 858801 | NO | 0 | NO | 0 | 0 | EASY | <60 | NO | NO | NO | EASY |
| 50 | 921009 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 51 | 921736 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 52 | 887610 | NO | 0 | YES | 1 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 53 | 912188 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 54 | 906432 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | YES | V DIFF |
| 55 | 865717 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 56 | 924045 | NO | 0 | YES | 1 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 57 | 930175 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 58 | 916720 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 59 | 118482 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 60 | 878963 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 61 | 564198 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 62 | 918340 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 63 | 916614 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 64 | 921009 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 65 | 921736 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 66 | 698328 | NO | 0 | NO | 0 | 1 | EASY | <60 | NO | NO | NO | EASY |
| 67 | 922241 | NO | 0 | YES | 1 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 68 | 855295 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 69 | 919786 | NO | 0 | NO | 0 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 70 | 825910 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 71 | 857580 | NO | 0 | NO | 0 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 72 | 662477 | YES | 1 | NO | 0 | 7 | DIFF | <60 | NO | NO | NO | EASY |
| 73 | 921244 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 74 | 929836 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 75 | 8988 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 76 | 936663 | YES | 1 | NO | 0 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 77 | 934602 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 78 | 13777 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 79 | 331857 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 80 | 938205 | NO | 0 | YES | 1 | 3 | EASY | <60 | NO | NO | NO | EASY |

| Sr. No | MRD No | Name | Age | Age Score | Sex | H/O hospitaliz | Past history of hospitalization for gall stone disease SCORE | BMI | BMI SCORE | ABDOMINAL SCAR | ABDOMINAL SCAR SCORE | Palpable GB | Palpable GB score | GB Wall Thickness | GB Wall Thickness SCORE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 937753 | T K | 80 | 1 | F | YES | 4 | 29.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 82 | 937469 | C K | 32 | 0 | F | NO | 0 | 25.7 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 83 | 908277 | R K | 31 | 0 | F | NO | 0 | 27.9 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 84 | 661418 | K K | 42 | 0 | F | NO | 0 | 24.2 | 0 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 85 | 848006 | S K | 36 | 0 | F | NO | 0 | 25.7 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 86 | 912981 | D K | 33 | 0 | F | NO | 0 | 27.8 | 2 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 87 | 812369 | B S | 32 | 0 | M | YES | 4 | 24.8 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 88 | 877361 | K S | 50 | 0 | F | NO | 0 | 24.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 89 | 932130 | P K | 40 | 0 | F | NO | 0 | 26.2 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 90 | 880290 | A S | 38 | 0 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | YES | 1 | <4 | 0 |
| 91 | 880020 | A R | 38 | 0 | F | NO | 0 | 24.9 | 0 | NO SCAR | 0 | YES | 1 | >4 | 2 |
| 92 | 882045 | S V | 25 | 0 | M | NO | 0 | 26.4 | 1 | NO SCAR | 0 | YES | 1 | <4 | 0 |
| 93 | 880233 | M K | 36 | 0 | M | YES | 4 | 24.2 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 94 | 619086 | M S | 71 | 1 | M | NO | 0 | 27.6 | 2 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 95 | 882916 | S M | 55 | 1 | F | NO | 0 | 25.7 | 1 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 96 | 882124 | A K | 40 | 0 | F | YES | 4 | 24.9 | 0 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 97 | 884607 | R S | 48 | 0 | M | YES | 4 | 22.4 | 0 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 98 | 879001 | M K | 32 | 0 | F | NO | 0 | 28.2 | 2 | SUPRAUMBILICAL | 2 | NO | 0 | <4 | 0 |
| 99 | 885390 | M K | 27 | 0 | F | NO | 0 | 24.9 | 0 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 100 | 857492 | R R | 52 | 1 | F | YES | 4 | 25.8 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 101 | 101334 | S K | 40 | 0 | F | NO | 0 | 26.3 | 1 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 102 | 288041 | A G | 41 | 0 | M | NO | 0 | 24.2 | 0 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 103 | 702609 | J S | 60 | 1 | M | NO | 0 | 28.2 | 2 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 104 | 888300 | A K | 45 | 0 | M | NO | 0 | 24.2 | 0 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 105 | 890639 | R K | 36 | 0 | F | NO | 0 | 26.8 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 106 | 889162 | A K | 31 | 0 | M | NO | 0 | 25.5 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 107 | 890181 | K S | 75 | 1 | M | NO | 0 | 28.5 | 2 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 108 | 890287 | D S | 28 | 0 | F | NO | 0 | 27.8 | 2 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 109 | 881090 | N G | 29 | 0 | F | NO | 0 | 27 | 1 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 110 | 892944 | S R | 57 | 1 | F | YES | 4 | 26.2 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 111 | 877794 | S R | 80 | 1 | F | YES | 4 | 25.8 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 112 | 884902 | R M | 44 | 0 | F | NO | 0 | 25.7 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 113 | 877393 | V S | 71 | 1 | M | YES | 4 | 26.4 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 114 | 895924 | P J | 60 | 1 | M | NO | 0 | 26.8 | 1 | INFRAUMBILICAL | 1 | NO | 0 | <4 | 0 |
| 115 | 185573 | A V | 23 | 0 | F | NO | 0 | 23.1 | 0 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 116 | 480045 | S S | 31 | 0 | M | YES | 4 | 26 | 1 | NO SCAR | 0 | NO | 0 | >4 | 2 |
| 117 | 823786 | M H | 75 | 1 | M | YES | 4 | 25.4 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 118 | 527251 | S K | 34 | 0 | F | NO | 0 | 25.7 | 1 | INFRAUMBILICAL | 1 | NO | 0 | >4 | 2 |
| 119 | 907556 | S K | 60 | 1 | M | YES | 4 | 25.2 | 1 | NO SCAR | 0 | NO | 0 | <4 | 0 |
| 120 | 907852 | R B | 62 | 1 | F | YES | 4 | 25.4 | 1 | SUPRAUMBILICAL | 2 | NO | 0 | <4 | 0 |

| Sr. No | MRD No | Pericholecystic Collection | Pericholecystic Collection SCORE | impacted stone | score of impacted stone | total Score | Expected outcome | TIME TAKEN | INJURY TO DUCT / ARTERY | BILE SPILLAGE | CONVESRION TO OPEN CHOLECYSTECTOMY | INTRA OPERATIVE OUTCOME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 937753 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 82 | 937469 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 83 | 908277 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | DIFF |
| 84 | 661418 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 85 | 848006 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 86 | 912981 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 87 | 812369 | NO | 0 | NO | 0 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 88 | 877361 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 89 | 932130 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 90 | 880290 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 91 | 880020 | YES | 1 | YES | 1 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 92 | 882045 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 93 | 880233 | NO | 0 | NO | 0 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 94 | 619086 | YES | 1 | YES | 1 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 95 | 882916 | NO | 0 | NO | 0 | 5 | EASY | <60 | NO | NO | NO | EASY |
| 96 | 882124 | YES | 1 | YES | 1 | 9 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 97 | 884607 | NO | 0 | YES | 1 | 6 | DIFF | <60 | NO | NO | NO | EASY |
| 98 | 879001 | YES | 1 | YES | 1 | 6 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 99 | 885390 | YES | 1 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 100 | 857492 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 101 | 101334 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 102 | 288041 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 103 | 702609 | NO | 0 | NO | 0 | 7 | DIFF | <60 | NO | NO | NO | EASY |
| 104 | 888300 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 105 | 890639 | NO | 0 | NO | 0 | 3 | EASY | <60 | NO | NO | NO | EASY |
| 106 | 889162 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 107 | 890181 | NO | 0 | YES | 1 | 6 | DIFF | <60 | NO | NO | NO | EASY |
| 108 | 890287 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 109 | 881090 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 110 | 892944 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 111 | 877794 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 112 | 884902 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 113 | 877393 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 114 | 895924 | YES | 1 | NO | 0 | 5 | EASY | 60-120 | NO | NO | NO | DIFF |
| 115 | 185573 | NO | 0 | NO | 0 | 2 | EASY | <60 | NO | NO | NO | EASY |
| 116 | 480045 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 117 | 823786 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 118 | 527251 | NO | 0 | NO | 0 | 4 | EASY | <60 | NO | NO | NO | EASY |
| 119 | 907556 | NO | 0 | NO | 0 | 7 | DIFF | 60-120 | NO | NO | NO | DIFF |
| 120 | 907852 | NO | 0 | NO | 0 | 8 | DIFF | 60-120 | NO | NO | NO | DIFF |

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No. BFUHS/2K21p-TH/ 5058 Date 20/1/2021

The Principal,
DMC,Ludhiana.

**Subject:** **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 22.01.2021 has approved the plan of thesis of **Dr. Vishal Mangotra**, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

**Topic Plan of Thesis**
Evaluation of preoperative scoring system for predicting difficult laparoscopic cholecystectomy

Supervisor
Dr. Munish Trehan
Assoc. Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

Co-Supervisor
Dr. Jaspal Singh
Prof. & Head,
Dept. of Surgery,
DMCH, Ludhiana.

Dr. Sanjeev Kumar Singla
Prof.,
Dept. of Surgery,

The student has to submit the three copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,( if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

*Note :*

1. ***If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.***
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

# EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SURGERY

IN

GENERAL SURGERY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

NOVEMBER 2019

DR. VISHAL MANGOTRA

DEPARTMENT OF GENERAL SURGERY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

# ABSTRACT OF PLAN OF THESIS

| | |
|---|---|
| Title | EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY |
| For the degree of | M.S. General Surgery |
| Name of the candidate | Dr. Vishal Mangotra |
| Supervisor | Dr. Munish Trehan, Associate Professor, Department of Surgery |
| Co-supervisor | Dr. Jaspal Singh, Professor & Head, Department of Surgery<br>Dr. Sanjeev kumar Singla, Professor, Department of Surgery |
| Institution | Dayanand Medical College & Hospital, Ludhiana |
| University | Baba Farid University of Health Sciences, Faridkot |

**Introduction:** Laparoscopic cholecystectomy is considered as the gold standard for the surgical treatment of gallbladder diseases. At times it is easy and can be done quickly. Occasionally it is difficult and takes longer time or may need conversion to an open surgery. It would be extremely helpful if we could have a preoperative system that would predict degree of difficulty and conversion to open surgery.

**Aim of Study:** To evaluate a preoperative scoring system for predicting difficult laparoscopic cholecystectomy.

**Materials & methods:** Data will be collected from all the patients admitted in DMC & H for laparoscopic cholecystectomy during the period of Jan 2020 to Jun 2021 in form of predesigned proforma which will include detailed history, examination & radiological reports. A preoperative score will be given to every patient on the basis of selected parameters. All the intra operative events will be recorded & surgery will be labeled as easy / difficult / very difficult based on these findings. The scores will be compared in each patient to come to a conclusion that whether preoperative scoring system is a useful method or not.

**Clinical Significance:** Forecast of a difficult laparoscopic cholecystectomy can help the surgeon as well as patients to prepare better for any intraoperative risk & its effective management.

**Keyword:** Lap Chole, Difficult, Prediction, Preoperative scoring System.

| (Signature) | (Signature) | (Signature) | (Signature) | (Signature) |
|---|---|---|---|---|
| Candidate | Co-supervisor | Co-supervisor | Supervisor | Principal |

## CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** exist in the Department of General Surgery, DMC&H, Ludhiana and will be provided to be candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

**Supervisor**

**Dr. Munish Trehan**
Associate Professor
Department of Surgery
DMCH, Ludhiana

**Co-Supervisor(s)**

**Dr. Jaspal singh**
Professor & Head
Department of Surgery
DMCH, Ludhiana

**Dr. Sanjeev Kumar Singla**
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Department of Surgery
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**HEAD OF DEPARTMENT**

**Dr. Jaspal Singh**
Professor and Head
Department of Surgery
DMCH, Ludhiana

Place: _____

Date: _____

**APPROVAL PROFORMA**
**BY RESEARCH & ETHICAL COMMITTEE**
**DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA**

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|---|---|
| **Name of candidate** | DR. VISHAL MANGOTRA |
| **Department** | GENERAL SURGERY |
| **Topic of Thesis** | EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY |
| **Likely date of appearing in PG examination** | MAY/JUNE 2022 |
| **Date of enrollment** | MAY 17, 2019 |
| **Name of Head of Department** | DR. JASPAL SINGH |
| **1) Supervisor**<br>**2) Co-Supervisor** | DR. MUNISH TREHAN<br>DR. JASPAL SINGH<br>DR. SANJEEV KUMAR SINGLA |
| **Signature of Members of Research Committee with Stamp** | **Signature of Members of Ethics Committee with Stamp** |
| Dr. Jaspal Singh<br>(Professor & Head, Surgery) | Mr. A K Jindal<br>(Member, Ethics Committee) |
| Dr. Dinesh Gupta<br>(Professor & Head, Medicine) | Dr. Anu Sharma<br>(Professor, Anatomy) |
| Dr. Sandeep Kaushal<br>(Assistant Dean Academics) | Dr. Deepinder K Chhina<br>(Professor & Head, Microbiology) |
| Dr. Rajoo Singh Chhina<br>(Dean Academics) | Dr. Neena Sood<br>(Professor & Head, Pathology) |
| Dr. Gurpreet S Wander<br>(Vice Principal) | Dr. Gurpreet S Wander<br>(Vice Principal) |
| | Dr. Gagandeep Singh<br>(Secretary, Ethics Committee<br>Professor & Head, Neurology) |

**Approved: Yes / ~~No~~**

**Dr. Sandeep Puri**
**Chairperson**
**Research Committee**

Chairperson
Research Committee

**Approved: Yes / ~~No~~**

**Prof. Arvind Malhotra**
**Chairman**
**Ethics Committee**

Chairperson
Ethics Committee

# BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

## PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

| | | |
|---|---|---|
| 1 | NAME OF THE CANDIDATE AND ADDRESS | DR. VISHAL MANGOTRA<br>H.NO 169/11 GANDHINAGAR ,<br>DINANAGAR<br>DISTT GURDASPUR – 143531 |
| 2 | NAME OF THE INSTITUTE | DAYANAND MEDICAL COLLEGE AND HOSPITAL |
| 3 | COURSE OF STUDY AND SUBJECT | M.S. GENERAL SURGERY |
| 4 | DATE OF ADMISSION OF COURSE | 17 MAY, 2019 |
| 5 | TITLE OF THE TOPIC | EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY |

## 6. BRIEF RESUME OF THE INTENDED WORK

### 6.1 NEED FOR THE STUDY

Gall stone disease represents a significant burden for health care system world-wide and is one of the most common disorder among the patients presenting to emergency rooms with abdominal discomfort.[1] Gall stone are present in 10-15 % of the general population.[2] Most patients with gallstones remain asymptomatic for many years and may in fact, never develop symptoms. However, the consequences of gallstones may be severe, ranging from brief episodes of biliary pain to potentially life-threatening complications, such as acute cholecystitis and pancreatitis, or rarely gallbladder cancer.

At present, laparoscopic cholecystectomy (LC) is considered as the surgical treatment of choice for gall bladder diseases.[3] It is one of the most common operations performed by the General surgeons. It has many advantages over open cholecystectomy in terms of minimal postoperative pain & discomfort, shorter hospital stay, earlier oral intake, better cosmetics, early return to normal activity and lesser rate of postoperative infections.

Despite the increasing experience and substantial advancement in laparoscopy, conversion rates of approximately 5% to 10 % have been reported in different published series.[4-5].

Many risk factors have been evaluated in different published studies and found to be make laparoscopic cholecystectomy difficult. Some of these factors are old age, male sex, attacks of acute Cholecystitis with fever and Leukocytosis, deranged liver functional enzymes, comorbidities, obesity, previous abdominal surgery, and certain ultrasonographic findings i.e. thickened gall bladder wall, distended gall bladder, pericholecystic fluid collection and impacted stone etc.[6-7]

Preoperative prediction of the risk of conversion or difficulty of operation is an important aspect of planning laparoscopic surgery. With the help of accurate prediction, high risk patients may be informed before hand and they may have a chance to make arrangements. Surgeons too may get an indication so that they may schedule the time and team for the operation appropriately. Patients predicted to have a

high risk can be scheduled for longer hospitalization and more intensive post-operative care. This may also help the hospital administration to plan and predict admissions and bed vacancy more efficiently.

Several studies had been carried out to assess the risk of conversion preoperatively by using different parameters. But patients were not scored in these studies. An accurate scoring system is needed on this issue to make more reliable evaluations and provide better surgical practice. A score can reduce numerous clinical variables and knowledge to a small number. The scoring system helps the surgeons make standard predictions independent of their clinical experience. A well defined cut-off score may clarify what "difficult Laparoscopic Cholecystectomy" means and surgeons from different parts of the world can also communicate better on this issue.

Our aim is to evaluate the preoperative scoring system for predicting difficult laparoscopic cholecystectomy devised by Randhawa et al[5] in scenario of our hospital Dayanand Medical College & Hospital Ludhiana.

## 6.2 REVIEW OF LITERATURE

Laparoscopy from Greek, Laparo meaning the flank and skopein meaning to examine. The first experimental laparoscopy was performed in Berlin in 1901 by the German surgeon Georg Kelling, who used a cystoscope to peer into the abdomen of a dog after first insufflating it with air. Kelling also used filtered atmospheric air to create a pneumoperitoneum, with the goal of stopping intra-abdominal bleeding (Ectopic pregnancy, bleeding ulcers, and pancreatitis).[9]

Prof Dr Med Erich Mühe of Böblingen, Germany, performed the first laparoscopic cholecystectomy on September 12, 1985.[10] Gradually it replaced conventional open cholecystectomy. Now a days laparoscopic cholecystectomy is the standard procedure for routine gall bladder removal. Management of biliary tract disease has evolved from being a major procedure to a relatively safe and tolerable day care procedure today, offering early return to full activity. But still approximate 5-10 % requires conversion to open cholecystectomy due to various reasons.[4-5] Many studies have been attempted to evaluate the factors which makes laparoscopic cholecystectomy (LC) difficult and to predict conversion to an open surgery preoperatively.

In a study conducted by Kama et al, in Ankara Numune Hospital of turkey, of the 1000 patients in whom laparoscopic cholecystectomy was attempted, 48(4.8%) required conversion to open surgery. Significantly independent predictive factors for conversion were male gender, previous abdominal surgery, acute cholecystitis, thickened gallbladder wall on preoperative ultrasonography, and suspicion of common bile duct stones.[11]

A study by Lee et al, Total of 346 Laparoscopic cholecystectomies and Laparoscopic to open cholecystectomies were identified. The Laparoscopic to open group had 41 identified with a conversion rate of 11.9 per cent. The Laparoscopic to open group was compared with 100 randomly chosen laparoscopic cholecystectomies. Risk factors that reached statistical significance for conversion included advanced age,

diagnosis of acute cholecystitis, and gallbladder wall thickness greater than 3 mm (P = 0.0009). Average operative time was higher in Lap converted to open (LOC) compared with open cholecystectomy (123 minutes average vs 109 minutes average). Of the reasons for conversion, the degree of inflammation was the most common (51.2%). Preoperative risk factors that were associated with need for conversion were advanced age, male gender, previous upper abdominal surgery, preoperative diagnosis of acute cholecystitis, and pericholecystitic fluid.[12]

In an another study conducted by Elgammal et al. Of 100 patients having symptomatic cholelithiasis & undergoing laparoscopic cholecystectomy in General Surgery in Menoufia University Hospital found that The difficult laparoscopic cholecystectomy and conversion to open surgery can be predicted preoperatively on the basis of number of previous attacks of cholecystitis, WBC count, Gall bladder wall thickness and size of stones.[13]

Fried GM et al conducted a study of 1,676 consecutive patients in whom laparoscopic Cholecystectomy (LC) was attempted. Factors evaluated were age, sex, history of acute cholecystitis, pancreatitis, or jaundice, previous abdominal surgery, abnormalities of liver function tests, thickened gallbladder wall identified by preoperative ultrasound, obesity or morbid obesity, and cumulative institutional experience in (Laparoscopic cholecystectomy) LC. Conversion to open cholecystectomy (OC) was required in 90 of 1,676 (5.4%) patients. Significant preoperative predictors of conversion were acute cholecystitis, increasing age, male sex, obesity, and thickened gallbladder wall found by ultrasound. [14]

Simopoulo et al, conducted a study to evaluate preoperative factors associated with conversion to open cholecystectomy in elective cholecystectomy and acute cholecystitis. The records of 1,804 patients who underwent cholecystectomy were reviewed retrospectively. The demographics and preoperative data of patients who required conversion to laparotomy were compared to those with successful laparoscopic cholecystectomy. Conversion to open cholecystectomy

was needed in 94 patients (5.2%),of which 44 (2.8%) had no inflammation and 50 (18.4%) had acute inflammation of the gallbladder. Male gender, age older than 60 years, previous upper abdominal surgery, diabetes, and severity of inflammation were all significantly correlated with an increased conversion rate to laparotomy. Also, the conversion from laparoscopic to open cholecystectomy in acute cholecystitis patients was associated with greater white blood cell count, fever, elevated total bilirubin, aspartate transaminase, and alanine transaminase levels, and the various types of inflammation.[15]

In a study conducted by shrirang V kulkarni et al, in which 166 patients were studied with age ranging from 10-80 years, maximum incidence (36.14%) being in the age group 35-50 years. The time taken for LC increased significantly with increasing age. 70.48% were females but gender status did not affect the difficulty. Increasing body mass index (BMI) also increased the surgery time as well as the conversion rate (7.69% in patients with BMI >30Kg/m2). Clinically palpable gallbladder increased the surgery duration, difficulty and conversion rate. TLC >11000/mm3 , contracted gallbladder, wall thickness ≥4mm made LC longer, while multiple stones increased surgeon's difficulty and impacted stone in gallbladder neck increased the conversion rate.[16]

In a study conducted by Jagdish nachnani et al of 105 patients, 12 (11.4%) required conversion to open cholecystectomy. Significant predictors of conversion were body mass index> 30 Kg/m2, male gender, past history of acute cholecystitis or acute pancreatitis, past history of upper abdominal surgery, and gall bladder wall thickness exceeding 3 mm.[17]

Debananda Tudu & Bana Bihari Mishra[18] conducted a study at VSS Institute of Medical Sciences and Research including 100 cases with Symptomatic Cholelithiasis & found that Previous abdominal surgery, duration since acute attack, number of previous attacks, ultrasonography findings of increased wall thickness, stone impaction at neck and pericholecystic collection, increased total WBC count are associated with difficult laparoscopic cholecystectomy.[18]

Another study by Alponat et al, Data from 783 patients in whom Laparoscopic cholecystectomy (LC) was attempted was retrospectively analyzed. Conversion was required in 58 (7.4%) patients, of which 48 (83%) were elective and 10 (17%) emergency. Factors evaluated were age, sex, obesity, duration of gallstone disease, co-morbid factors, indication for surgery, previous abdominal surgery, fever, physical examination findings, white blood cell (WBC) count, liver function tests, ultrasound findings, and the experience of the surgeon. Acute cholecystitis, rigidity in the right upper abdomen, fever, thickened gallbladder wall on ultrasonography, elevated alkaline phosphatase (ALP), liver transaminases and the WBC count were significant predictors of conversion in the univariate analysis. Multivariate logistic regression analysis on these significant predictors showed that acute cholecystitis [odds ratio (OR) = 3.12], thickened gallbladder wall on ultrasonography (OR = 3.75), elevated ALP (OR = 2.23), and WBC count (OR = 3.69) were jointly significant[19].

A study was conducted by livingstone et al., to determine the national incidence and risk factors for conversion from laparoscopic to open cholecystectomy. The National Hospital Discharge database was acquired. All gallbladder disease related admissions were extracted. Approximately 25% of all cholecystectomies were performed by the open technique. Of the remaining 75%, there was approximately 5% to 10% conversion rate. The major risk factors for conversion were male sex, obesity, and cholecystitis. Concurrent choledocholithiasis, cholelithiasis, and cholecystitis were associated with a conversion rate of 25%. [20]

## 6.3 AIMS AND OBJECTIVES OF THE STUDY

Preoperative prediction of difficult laparoscopic cholecystectomy using a scoring system.

## 7.0 MATERIALS AND METHODS

### 7.1 SOURCE OF DATA

Data will be collected from all the patients admitted in DMC & H for laparoscopic cholecystectomy during the period of 1st Jan 2020 to 30th June 2021 considering inclusion & exclusion criteria. A detailed proforma will be used to record information regarding patient history, clinical examination, sonographical findings & intraoperative details.

### 7.2 METHOD OF COLLECTION OF DATA

A prospective study will be conducted in general surgery department of Dayanand Medical College and Hospital, Ludhiana. A detailed proforma will be filled including basic details, history, examination & sonographical findings.

**Sample size** – Time bound study.

**Inclusion criteria –**

All the patients who have been clinically and radiologically (ultrasound abdomen) diagnosed with cholelithiasis / cholecystitis and planned for laparoscopic cholecystectomy.

**Exclusion criteria –**

Lap to open conversion due to equipment failure.

Patient with carinoma gall bladder, CBD stone, dilated CBD & obstructive jaundice.

**Duration of study:** 1st January 2020 to 30th June 2021.

After the work up, a preoperative score will be given to each of the patient on the basis of parameters described in the scoring system of Randhawa and Pujahari [8]

Randhawa and pujahari preoperative scoring system :->

| History | | | Max score |
|---|---|---|---|
| Age | <50 (0) | > 50 (1) | 1 |
| Sex | F (0) | M (1) | 1 |
| H/O hospitalization for Gall stone disease | No (0) | Yes (4) | 4 |
| Clinical | | | |
| BMI | <25 (0) | >25-27.5 (1)<br>>27.5 (2) | 2 |
| Palpable GB | No (0) | Yes (1) | 1 |
| Abdominal scar | No (0) | Infraumblical (1)<br>Supraumblical (2) | 2 |
| Sonography | | | |
| Wall thickness | Thin | Thick (>4mm) (2) | 2 |
| Impacted stones | No (0) | Yes (1) | 1 |
| Pericholecystic collection | No (0) | Yes (1) | 1 |

Score 0-5 easy, 6-10 difficult, 11-15 very difficult.

Following evaluation, patients will be subjected to laparoscopic cholecystectomy & the following intraoperative events will be recorded and surgery will labeled as easy / difficult / very difficult.

| Parameters | Grading |
|---|---|
| Time taken < 60 min and no bile spillage and no injury to duct | Easy |
| Time taken 60-120 min and / or bile or stone spillage and / or injury to duct / artery | Difficult |
| Time taken >120 min or conversion | Very Difficult |

Preoperative Score and surgery outcome will be compared.

**Outcome**: In this study, we will try to evaluate the Randhawa and Pujahari scoring system[3] in predicting difficult laparoscopic cholecystectomy preoperatively.

**Statistical analysis**:

Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

**7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.**

The study does not require any investigation or intervention other than ultrasound abdomen .

**7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?**

Yes attached herewith

**List of References:**


1. Shaheen NJ, Hansen RA, Morgan DR, et al. The burden of gastrointestinal and liver diseases, 2006. Am J Gastroenterol. 2006;101:2128–38.
2. National Institutes of Health Consensus Development Conference Statement: Gallstones and Laparoscopic Cholecystectomy. September 14-16, 1992. J Laparoendosc Surg. 1993;3:77-90.
3. Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy. The new 'gold standard'? Arch Surg. 1992;127:917-23.
4. Sakpal SV, Bindra SS, Chamberlain RS. Laparoscopic cholecystectomy conversion rates two decades later. *JSLS*. 2010;14:476–83.
5. Livingstone EH, Rege RV. A nationwide study of conversion of laparoscopic to open cholecystectomy. Am J Surg. 2004;188:205-11.
6. Sanabria JR, Gallinger S, Croxford R, Strasberg SM. Risk factors in elective laparoscopic cholecystectomy for conversion to open cholecystectomy. Journal of the American College of Surgeons. 1994;179:696-704.
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8. Randhawa JS, Pujahari AK. Preoperative prediction of difficult lap chole: a scoring method. Indian journal of surgery. 2009;71:198-201.
9. Mishra RK. Chronological advances in minimal access surgery. Mishra RK (editor). Textbook of Practicle Laparoscopic surgery. 3rd edition. Jaypee Publishers: New Delhi; 2013. p. 5-8.
10. Reynolds W Jr. The first laparoscopic cholecystectomy. Journal of the Society of Laparoendoscopic Surgeons. 2001;5:89-94.

11. Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapci M. A riskscore for conversion from laparoscopic to open cholecystectomy. The American journal of surgery. 2001;181:520-5.
12. Lee NW, Collins J, Britt R, Britt LD. Evaluation of preoperative risk factors for converting laparoscopic to open cholecystectomy. The American surgeon. 2012;78:831-3.
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14. Fried GM, Barkun JS, Sigman HH, Joseph L, Clas D, Garzon J, et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. The American journal of surgery. 1994;167:35-41.
15. Simopoulos C, Botaitis S, Polychronidis A, Tripsianis G, Karayiannakis AJ. Risk factors for conversion of laparoscopic cholecystectomy to open cholecystectomy. Surg Endosc. 2005;19:905–9.
16. Kulkarni, S, K S. (2018). Preoperative predictors of a difficult laparoscopic cholecystectomy. International Surgery Journal. 2018;5:608.
17. Nachnani J., Supe Pre-operative prediction of difficult laparoscopic cholecystectomy using clinical and ultrasonographic parameters. Indian J. Gastroenterol. 2005;24:16–18.
18. Tudu D, Mishra B. Prediction of difficult cholecystectomy, a study of 100 cases. International Journal of Research in Medical Sciences. 2017;7:63-6.
19. Ahmet A, Cheng K, Bee K, Andrea R, Peter G. Predictive Factors for Conversion of Laparoscopic Cholecystectomy. World journal of surgery. 1997;21:629-33.

20. Livingstone EH, Rege RV. A nationwide study of conversion of laparoscopic to open cholecystectomy. Am J Surg. 2004;188:205-11.

# PROFORMA

Sr. No.

Name:

Age:

Sex:

Address:

MRD No. :

Date of Admission:

Date of Discharge

Presenting complaints:

Past history of hospitalization for gall stone disease:

General physical examination:

- BP
- Pulse
- Respiratory rate
- Temperature
- Weight
- Height
- BMI

Local examination

- Palpable gall bladder
  - No ( )
  - Yes ( )
- Abdominal scar
  - No ( )
  - Infraumbilical ( )
  - Supraumbilical ( )

**SIGN OF CANDIDATE**

**SIGN OF SUPERVISOR**

Sonographic findings:

- wall thickness
  - <4mm ( )
  - >4mm ( )
- impacted stone
  - No ( )
  - Yes ( )
- Pericholecystic collection
  - No ( )
  - Yes ( )

| | |
|---|---|
| Total preoperative score of the patient | |
| Expected outcome | Easy ( ), difficult ( ), very difficult ( ) |

Intraoperative parameters:

- Time taken <60min ( ) 60-120 min ( ) >120min ( )
- Injury to duct / artery No ( ) Yes ( )
- Bile spillage No ( ) Yes ( )
- Conversion to open cholecystectomy. No ( ) Yes ( )

**SIGN OF CANDIDATE**

**SIGN OF SUPERVISOR**

## INFORMED PATIENT CONSENT

Date: _____

I.....D/o,W/o,S/o.....

.....am willing to participate in the study **"EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

**Signature of Candidate**

**Signature of Supervisor**

# मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____
निवासी _____
इस शोधकार्य **"EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____
गवाह के हस्ताक्षर
नाम:

_____
रोगी के हस्ताक्षर/अंगूठे का निशान
नाम:

_____
अन्वेषक के हस्ताक्षर

_____
विद्यार्थी के हस्ताक्षर

# ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

**"EVALUATION OF PREOPERATIVE SCORING SYSTEM FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY"** ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ